Prescriber use of Medicines Information Service advice in their decision-making and patient care: an exploratory qualitative study

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A thesis submitted in partial fulfilment of the requirements of the University of Wolverhampton for the degree of Doctor of Philosophy

September 2020

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Date……12/09/2020……

Acknowledgement

Thank you to all those involved in this research, in particular all the clinicians who kindly agreed to be interviewed, MI staff for recruiting interviewees, and the three final year pharmacy undergraduates for helping with some of the telephone interviews. Also, thank you to my family and friends for being so patient and supportive. Finally, thank you to my husband for all his encouragement and understanding.

Abstract

Pharmacy-led Medicines Information (MI) Services provide evidence-based advice to clinicians, with high levels of user satisfaction. However, satisfaction does not necessarily reflect improved patient care or patient outcome. This has led to MI research concentrating on the effect MI advice has on patients, despite a lack of agreed definitions of effectiveness and the construction of inappropriate outcome measures. Although the majority of prescribing happens in primary care, most MI research has focused on secondary care. The aim of this qualitative study was to better understand how primary care clinicians used MI advice in shaping their prescribing decision-making and subsequent patient care.

Taking an interpretive, idealist perspective and using a generic qualitative, exploratory methodological approach, this study tried to understand how prescribers use MI advice in decision-making and patient care. Prescribers (general practitioners and dentists) across England who contacted MI Services with a medicine-related question, were interviewed by telephone. To expand on findings from these interviews, additional prescribers in North West England were interviewed face-to-face. All interviews (n=55) were analysed inductively using constant comparison to identify themes.

Key findings of this study were clinicians describing using MI advice as a safety net to shape, support, or do their difficult research and make prescribing decisions, especially for complex or high risk cases. New knowledge was incorporated into their 'mindlines' and shared with their 'community of practice', for future decision-making. They valued advice provided by a trusted, expert 'help desk', which empowered them to make prescribing changes for their patients confidently and safely, and was also quicker than, and avoided, patient referrals.

To conclude, this is the first study to describe the direct influence MI advice has on clinician decision-making and prescribing. In light of this work there is a need to revisit currently used definitions describing impact and outcome, with MI services working alongside health library services to achieve this goal. The role of medicines advice giving in prescribing models also needs to be recognised.

List of publications

Rutter, J., Fitzpatrick, R. and Rutter, P. (2015) What effect does medicine advice provided by UK Medicines Information pharmacists have on prescriber practice and patient care: a qualitative primary care study. *Journal of Evaluation in Clinical Practice* [Online], **21**(2), pp.307-312. Available at:<http://dx.doi.org/10.1111/jep.12310>.

Rutter, J. and Rutter, P. (2019) Impact of pharmacy medicine information service advice on clinician and patient outcomes: an overview. *Health Information and Libraries Journal* [Online], **369**(4), pp.299-317. Available at:<https://doi.org/10.1111/hir.12270>.

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List of abbreviations

ATA	Applied Thematic Analysis
AWMSG	All Wales Medicines Strategy Group
BNF	British National Formulary
CABG	Coronary Artery Bypass Graft
CCG	Clinical Commissioning Group
CDM	Clinical Decision-making
CDSS	Clinical Decision Support System
CILIP	Chartered Institute of Library and Information Professionals
CIT	Critical Incident Technique
CKD	Chronic Kidney Disease
CPD	Continuing Professional Development
DDI	Drug-Drug Interaction
DHI	Digital Health Information
EBM	Evidence-Based Medicine
EMA	European Medicines Agency
EMC	Electronic Medicines Compendium
GDC	General Dental Council
GMC	General Medical Council
GP	General Practitioner
GT	Grounded Theory
LIS	Library Information Services
MI	Medicines Information
MRP/MRQ	Medicines-Related Problem/Question
NHS	National Health Service
NHSE	NHS England
HRA	Health Research Authority
NICE	National Institute for health and Care Excellence
NMP	Non-Medical Prescriber
NREC	NHS Research Ethics Committee
NRES	National Research Ethics Service
NWMI	North West Medicines Information
OTC	Over the Counter
PHS	Practitioner Hours Saved
RCT	Randomised Controlled Trial

RMIC	Regional Medicines Information Centre
SCG	Shared Care Guideline
SDCEP	Scottish Dental Clinical Effectiveness Panel
SDM	Shared Decision-making
SIGN	Scottish Intercollegiate Guidelines Network
SLA	Service Level Agreement
SPS	Specialist Pharmacy Service
UKMI	United Kingdom Medicines Information
UKTIS	United Kingdom Teratology Information Service

List of definitions

Clinician: any health care professional involved in patient care, such as a doctor, dentist, nurse or pharmacist.

Coding: tagging and organising empirical data to analyse them. **Codes** describe a part of a theme or the boundaries of a theme.

Constant comparison: analytical process where data are repeatedly compared for new codes and themes until saturation is reached.

Constructivist: see **interpretivist**.

Deductive: an analytical approach where pre-defined ideas and hypotheses are used to code and analyse data.

Epistemology: the nature and status of knowledge. How we know reality.

Field notes: researcher notes recording incidents, observations and contextual information.

Grounded theory: a systematic, inductive qualitative methodology which aims to generate theory 'grounded' in the data.

Inductive: this is an analytical approach which is the opposite of the deductive approach, where the results are grounded in or derived from empirical data.

Interpretivist: also called **constructivist**. This paradigm assumes there are multiple interpretations of reality. Researchers try to understand how individuals construct their own reality within their social context.

Methodology: describes how you go about finding what reality is.

Medicines information advice: also described as an MI answer or information but described throughout this thesis as MI advice.

Medicines optimisation: helping people get the best from their medicines by listening to their needs and jointly deciding on the best medicine and the best way forward with their health, their care and their medicines.

Meta-theme: also called 'uber-themes' or unifying themes usually consist of two or more data-driven themes which correspond to content codes.

Node: the terminology used for a code in NVivo software.

NVivo: Computer assisted qualitative data analysis software produced by a company called QSR International.

Ontology: The philosophical study of the nature of being or existence, '*the nature of reality'*.

Paradigm: the philosophical view of research. A conceptual model or framework for how we look at reality.i.e. a "*set of common beliefs and agreements shared between scientists about how problems should be understood and addressed*".

Phenomenology: a philosophy and methodology which focusses on the perceptions, feelings and lived experiences of participants.

Polypharmacy: is a term that refers to either the prescribing or taking many medicines. For many years it referred to the prescription or use of more than a certain number of medicines, at least four or five or more medicines per day. More recently it has been used in the context of prescribing or taking more medicines that are clinically required.

Positivism: a research model which considers data or social facts as existing independently from the effects of participants and researchers.

Primary care: the first point of medical contact for patients delivered by a range of clinicians, including GPs, dentists, pharmacists and optometrists.

Purposive sampling: a method used by researchers to select participants considered most appropriate for a research study.

Reflexivity: refers to critical awareness, acknowledgement and questioning of the ways the researcher's attitudes, beliefs and role influence data collection, analysis and interpretation.

Reliability: also called 'dependability' in qualitative research. This involves the steps taken to ensure the research process is consistent.

Rigour: steps taken to ensure **validity (credibility)** and **reliability (dependability)** of the research.

Saturation: the point when coding and interpretation of data reveals no new categories or themes and addition of new participants is unlikely to produce new ideas.

Secondary care: the care provided by staff working in the hospital sector.

Shared care guideline: these are local policies which are put in place to enable clinicians to pick up the prescribing and monitoring of medicines/treatments in primary care in agreement with the initiating specialist.

Theme: ideas, phrases and/or concepts that identify or define what a statement is about or the core meaning of a statement or expression.

Thematic analysis: an iterative (changing) analytical approach used to identify themes in qualitative data.

Triangulation: comparison of different data sources, methods and/or analytical frameworks to support the research findings of a single study.

Validity: Also called 'credibility', steps taken to ensure the qualitative data collected, analysed and interpreted are meaningful and truthful i.e. accurately and credibly reflect what was intended.

Chapter 1 Introduction to this thesis

The aim of my research was to better understand how primary care clinicians use Medicines Information (MI) advice. The objectives were to explore how MI advice influences prescribing clinicians in their decision-making, and how they think MI advice subsequently affects patient care. In this chapter, I introduce this thesis by briefly explaining the background and my reasons for doing this qualitative study, plus the methodology and methods I used. Then I describe the structure and content of this thesis.

In the UK, the MI Service is National Health Service (NHS) funded, mostly based in hospitals and consists of a network of centres with local and regional responsibilities. Primary care clinicians have access to this pharmacist-led medicines advice service to help them answer their medicines-related questions (MRQ) and make prescribing decisions about their patients. However, awareness of this service by primary clinicians is low. In this thesis, I use the term clinician for any health care professional involved in patient care, such as a doctor, dentist, nurse or pharmacist. If a referenced study includes clinicians with prescribing responsibility, I describe them as 'prescribers' and if a study only includes one clinician type I describe them as such.

Prescribing medicines is the most common intervention in the NHS, yet clinicians sometimes struggle to keep up to date and to find answers to MRQs which occur during patient consultations and interrupt the prescribing process. This is complicated by the increasing numbers of patients requiring long-term medical treatment, often managed with polypharmacy. Various resources are available to help clinicians with their MRQs and the MI Service is one of these resources.

Previous studies have attempted to find out the effect (impact) of MI answers (an MI answer is defined here as information and/or advice and then referred to throughout this thesis as 'advice') on clinicians and patients by asking the opinion of clinicians, using surveys or structured interviews. However, most of these studies yielded questionable results as they utilised pre-determined survey options and non-validated biased impact rating scales. Despite these studies specifically focussing on the effect of MI advice on patient outcomes,

as I explain in Chapter 2, there are many reasons why determining MI effect is difficult to do. For instance, the originator of the enquiry may only see the patient for that snapshot in time e.g. at an outpatient appointment or as a locum, so they are no longer directly involved in the patient's care to the point of knowing the outcome. Due to such difficulties in establishing effect on patients, we can really only gather data on the influence of MI advice on clinicians who use the service and get their opinion about the effects of MI advice when used in patient care, and this is the focus of this thesis.

As an experienced MI pharmacist working at a regional MI centre in North West England, I knew that it was becoming increasingly important to try to better understand how MI advice influences clinicians and the care of their patients. By gaining this understanding, I could then use the findings to describe to commissioners, service providers and the wider NHS, how MI advice is utilised by clinicians working in primary care. Ultimately to illustrate the contribution the MI advice service makes to the NHS, its service users and their patients.

Initially, I was motivated to do research, as I held a regional research role for MI and was an active member of the UK Medicines Information (UKMI) research working group. Also, I wanted to do more research because I had completed an MSc research project about service users and non-users in primary care, and been involved in several undergraduate and other postgraduate MI studies. In addition, because of my role in MI, I knew there was very little understanding around how clinicians use MI advice in their decision-making and patient care. Finally, my husband who is a Professor of Pharmacy Practice, encouraged me to undertake further MI-related research and has undoubtedly been a considerable source of encouragement. All these were motivating factors for doing this study.

At this point, I would also like to explain my reasons for using personal pronouns throughout this thesis. Since this is primarily a qualitative study, writing in such a way shows my involvement as the researcher and is indicative of the reflexive approach I have taken.

For my study I adopted an interpretive, idealist position and used a generic, qualitative exploratory approach (Green, 1998; Porter, 2000; Caelli, Ray and Mill, 2003; Given, 2008; Kahlke, 2014; Auta, Strickland-Hodge and Maz, 2017), conducting interviews with prescribing clinicians in England by telephone to ask them about their use of MI advice. Further in-depth interviews were done face-to-face with clinicians in the North West region to expand on my findings. My analysis was inductive and I used constant comparative analysis to identify themes in the data (Green, 1998; Guest, MacQueen and Namey, 2012).

This thesis is organised into a further four chapters which encompass the background, methodology, findings, discussion and conclusions of my research. In this first chapter, I have introduced the study with my reasons for doing this research, briefly describing the aim and objectives, methodology and methods used. Chapter 2 discusses the background and reasons for doing this qualitative research, including a review of the literature which is relevant to the research question, with particular reference to MI studies. In Chapter 3, I describe the approach taken and justify the methodology and methods used for this study. In Chapter 4, I discuss my findings with illustrative quotes and integrated discussion, analysing and synthesising the findings supported by selected literature and research across all the interviews. Chapter 5 includes further critical discussion of my findings, which I relate to existing theories and models about decision-making and prescribing. Finally, I provide my overall discussion and conclusions, with recommendations for practice and policy, and my suggestions for further research.

Chapter 2 The background and reasons for this research

Introduction to this chapter

In this chapter, I underpin the need for my research by discussing the key areas relevant to the aim and objectives of my research. As the aim and objectives of this study were to better understand how primary care clinicians use MI advice in their prescribing decision-making and subsequent patient care, I considered the following questions:

- What are the problems faced by prescribing clinicians in primary care?
- How do clinicians make prescribing decisions?
- How do primary care clinicians answer questions about medicines that arise during the consultation?
- Who provides medicines information and advice to clinicians?
- Why do we need to know about the effects of MI advice on clinicians and patients?
- What has already been done to evaluate the effects of MI advice on clinicians and patients, and what are the limitations?
- What have similar services done to evaluate the effects of their service on clinicians and patients, and what are the limitations?
- What do we need to do next?

I have taken each of the questions above and structured this chapter to address each of these in turn. Firstly, I describe the increasing pressures on clinicians and the problems they face when prescribing. I then present an overview of studies conducted to help understand prescribing, this includes the processes and influencing factors involved in prescriber decision-making and some of the associated theories and models that have been published in this field. I also describe what clinicians do when they have a MRQ and the range of digital and human resources available for them to use. Following on from this, I review the published studies which have tried to evaluate the effects of MI Service advice, their findings and limitations. I also consider Health Library Information Services (LIS), as they too are NHS funded providers of information to clinicians, and their attempts to evaluate service effect in terms of impact and value. Finally, I explain why we need to better understand the effects of MI advice and why there was a need for this study. The purpose of the next section is to put into context the problems faced by primary care clinicians when providing evidence-based person-centred care.

The problems faced by prescribing clinicians in primary care

There are numerous factors that contribute to the complexity of prescribing for clinicians. Particularly, the ageing population, polypharmacy, the sheer number of medicines, the increased availability of information, provision of person-centred evidence-based care versus guideline driven care, and keeping up to date.

As there are more patients who are ageing, it is predicted that in the UK the number of people over the age of 85 who live with multiple morbidities and polypharmacy will double to 3.4 million by 2040. This means their management is more challenging for prescribers with greater numbers of medicines available, with consequently burgeoning amounts of digital information via intranets and the internet. Further adding to the difficulties faced by clinicians is the easy access patients, their families and carers have to digital health and medicines information, allowing them to research their condition online before asking a health professional (Pohjanoksa-Mantyla *et al.*, 2011; Bowes *et al.*, 2012; Wang *et al.*, 2012; Carter *et al.*, 2013). Thus the public are more aware of available treatments and are potentially more informed (Edwards *et al.*, 2012). Although some of this may be misinformation due to the availability of many unregulated sources of health and medicines information; which has the potential to complicate the consultation further. When patients present information to their General Practitioner (GP) or another clinician, ask for additional advice or even a particular treatment (Ahluwalia *et al.*, 2010; Bowes *et al.*, 2012; Townsend *et al.*, 2015) the consultation may become awkward if the clinician is 'put on the spot' because they do not know the answer. The clinician may then need to find information to answer the question asked.

Current UK NHS priority is to deliver high quality care to all patients, ensuring that they have a positive experience and access to the right treatment when they need it (Department of Health, 2016), although this is becoming increasingly difficult to do as advances in medical treatment mean people are now living for longer and surviving conditions that would have killed them forty years ago (Public Health England, 2016). As a consequence, more people have multiple long-term health conditions (LTC), such as cardiovascular

disease, diabetes, arthritis and dementia. These multiple morbidities mean patients are managed using an array of medicines, with the potential for adverse effects, interactions and patient concordance problems (Smith, O'Kelly and O'Dowd, 2010; NICE, 2016; European Association of Hospital Pharmacists, 2016). This cocktail of prescribed medicines may be further complicated by government self-care policies encouraging patients to self-medicate for minor ailments (Paudyal *et al.*, 2011). The use of complementary medicines further contributes to the complexity of treatment and dilemmas about treatment choices for both patients and clinicians.

The development of new medicines by the pharmaceutical industry has undoubtedly helped manage and cure people with once life-threatening conditions. Consequently, over the last 70 years the range of medicines available to prescribers has increased substantially. In just 2017 alone the European Medicines Agency (EMA) approved 92 medicines, 35 of which were new active substances (European Medicines Agency, 2018), and the British National Formulary (BNF) now contains around 1500 medicines (Joint Formulary Committee, 2018). As well as the sheer number of medicines, the mechanisms by which these new substances help treat medical conditions tend to be complex, in terms of their action and how they target specific sites in the body, creating further difficulties when making treatment decisions. To compound this, although most medicines are licensed, some are unlicensed or used in an unlicensed way. For example, amitriptyline is licensed for depression but is also used 'off licence' for neuropathic pain. This can cause more prescriber, and patient, uncertainty because manufacturer product information only refers to licensed indications.

Prescribing is not easy, as it is not just about choosing a medicine to treat a condition, but is about patient-centred care, now recently called person-centred care, and is an NHS goal. In fact, it is the vision of Health Education England and the NHS Library and Knowledge Services that 'NHS bodies, their staff, learners, patients and the public use the right knowledge and evidence, at the right time, in the right place, enabling high quality decision-making, learning, research and innovation to achieve excellent health care and health improvement' (Library and Knowledge Services, 2018). The provision of

person-centred care, involves medicines optimisation and shared decision-making (SDM).

Although the aim is for all clinicians to practise person-centred, Evidenced-Based Medicine (EBM), it can be difficult to interpret and use evidence appropriately and to adapt EBM to the individual patient situation (McCartney *et al.*, 2016). With more patients being treated closer to home, patient medications need to be optimised in primary care (NICE, 2015). This is difficult for clinicians to do amid all the uncertainty surrounding guideline driven care, with the increasing number and complexity of medicines (McCartney *et al.*, 2016), poor communication regarding specialist prescribing in hospital (NHS England, 2017), and the increasing availability of information to clinicians, patients and the public.

Even though evidence-based guidelines e.g. National Institute for Health and Care Excellence (NICE), Scottish Intercollegiate Guidelines Network (SIGN), All Wales Medicines Strategy Group (AWMSG) are available in the UK to inform clinicians about clinical management, they tend to be related to a specific clinical condition, making it difficult to manage a patient who has multiple medical conditions. As clinical guidelines are produced based on the EBM paradigm and tend to focus on a single disease or condition, they do not consider that the patient is a person, and increasingly older with multiple conditions. Thus, there needs to be a balance between evidence-based decision-making and person-centred care (NICE, 2018).

Arms' length bodies and those commissioning or influencing health care services have a responsibility to promote and monitor the use of evidence-based decision-making (Marshall, M. and Bibby, 2011; RPS, 2013). The Chartered Institute of Library and Information Professionals (CILIP) and Health Education England are campaigning for decisions in the health care sector to be fully evidence-based; calling on everyone involved in policy making and care delivery to make use of the skills of librarians and knowledge specialists. As stated by Professor Ian Cumming OBE, Chief Executive, Health Education England, when the Million Decisions Campaign was launched in 2017, ‘Every day across the health care sector more than a million decisions are made which have a profound impact on people’s lives and which influence the quality

and cost of health care services'. This campaign aims to highlight improvements in quality of care, patient experience and cost effectiveness when health care providers and their teams work closely with health librarians and knowledge specialists (Health Education England, 2017).

However, in order to prescribe safely and appropriately all clinicians are required to keep up to date and to provide effective treatments based on the best available evidence (General Medical Council, 2014). The General Medical Council (GMC) states that UK doctors need to recognise and work within the limits of their competence and keep their knowledge and skills up to date (General Medical Council, 2014). Similarly for dentists in the UK, the General Dental Council (GDC) Standards for the Dental Team, says they need to work within their knowledge, skills, professional competence and abilities and provide good quality care based on current evidence and authoritative guidance (General Dental Council, 2013). Yet, keeping up to date about all the medicines they prescribe or that are prescribed by others is demanding for clinicians, particularly those in primary care. GPs, who prescribe 98% of medicines in primary care, receive little formal training in prescribing, have limited time to assess the large amount of information available. Many GPs lack time or confidence to search for, or appraise, evidence-based information (Davidoff *et al.*, 1995; Iqbal and Glenny, 2002; Bourne, 2007; Bernard *et al.*, 2012; Zwolsman, 2012; Clarke *et al.*, 2013).

An older study by Davidoff *et al* reported that GPs needed to read 17 articles each day to keep up with the medical literature (1995). Given the expansion in medicine availability, this figure is likely to be higher today, although it may now be easier to keep up to date with use of the internet and articles being more readily accessible online. However, this wealth of digital information can be difficult to access, filter and use, causing not just information overload but information confusion and chaos (Beasley *et al.*, 2011). This high volume of constantly changing information about medicines means it can be problematic for clinicians to keep up to date (Clarke *et al.*, 2013). It is therefore practically impossible for a general clinician to keep abreast of all new medicines and changes to indications (licensed and unlicensed), as well as

interactions with other medicines, cautions, adverse effects, contraindications and warnings (Del Fiol, Workman and Gorman, 2014).

Compounding these issues, primary care clinicians, from time-to-time, may be asked by a specialist clinician e.g. consultant rheumatologist, to prescribe an unfamiliar medicine e.g. denosumab injection for post-menopausal osteoporosis. Yet, they too need to know about its safety and efficacy in practice, as even though these medicines should be prescribed via a shared care guideline (SCG), where specialists are obliged to provide relevant information to primary care, this may not always happen (General Medical Council, 2014). Either way, the primary care clinician must ensure they know enough about the medicine they are prescribing.

In summary, there are growing numbers of patients with multiple conditions, managed predominantly through medicines, by generalist clinicians in primary care. This means clinicians need to know more about prescribing medicines for complex patients, but difficulties in keeping up to date amidst the mass of accessible information mean they may need to seek help from others, such as MI Services.

Clinicians, prescribing and decision-making

Given people are living longer, often with one or more LTC, it is not surprising that prescribing rates continue to rise. In fact, prescribing represents the most common therapeutic intervention, with most LTCs managed through medication, which helps prevent further complications or serious events, such as stroke and heart attack. In 2016, 1.1 billion prescription items were dispensed by community pharmacies in England; a 47% increase in the last 10 years (Prescribing and Medicines Team, 2017). The complexity of patients and medicines means that prescribing is also becoming more challenging. It has been suggested that to facilitate prescribing decision-making for clinically complex people with polypharmacy, a more co-ordinated collaboration between health care professionals is required (Sinnige *et al.*, 2016).

In this section, I present an overview of studies conducted to help understand prescribing, this includes the processes and influencing factors involved in prescriber decision-making and some of the associated theories and models

that have been published in this field. I am discussing these now as they are relevant to my research aim and objectives, I align some of these influencing factors, theories and models to my chosen study and to my findings in Chapter 4 Findings and discussion, and finally discuss them in Chapter 5 Overall discussion and conclusions.

Prescribing is a complex decision-making process, and as such it is not sufficiently understood (Jackson, Mangoni and Batty, 2004; Thistlethwaite, Ajjawi and Aslani, 2010; Grant, Sullivan and Dowell, 2013), even though some theories and models have been developed, which I discuss later in this section. Although we know little about prescribing decision-making, some studies have been undertaken to help us understand prescribing in general practice (Bradley, 1992; Armstrong, Reyburn and Jones, 1996; Grant, Sullivan and Dowell, 2013). Two older UK studies explored the GP experience of making uncomfortable prescribing decisions and reasons for changes in prescribing behaviour (Bradley, 1992; Armstrong, Reyburn and Jones, 1996). While a more recent ethnographic study explored prescribing decisions and influencing factors in three GP practices in Scotland (Grant, Sullivan and Dowell, 2013). A further European study specifically evaluated prescribing behaviour relating to complex cases, i.e. older people with multiple morbidity and polypharmacy (Sinnige *et al.*, 2016). The latter study used pre-defined themes which included patient complexity, and treatment goals/strategies considered to be influencing factors for GP management of patients based on other studies (Luijks, H. D. *et al.*, 2012; Sinnott *et al.*, 2015). I briefly discuss the findings of these studies later in this section.

There is a wealth of published literature available on the wider subject of clinical decision-making (CDM) (Croskerry and Nimmo, 2011) and to review it fully, is beyond the scope of this thesis. Instead, I have focussed on the literature specifically around prescribing and decision-making, and I briefly discuss the main components of CDM as they are of relevance to my research.

It is thought that clinicians make prescribing decisions using the 'dual process' theory of decision-making (Bate *et al.*, 2012). Although, originally developed for diagnostic decision-making, it is a decision-making theory that has also been described for prescribing (Croskerry and Nimmo, 2011; Bate *et al.*,

2012). Usually clinicians use the System 1 process of decision-making, which is based on their existing 'tacit knowledge' and 'shortcuts', only switching to System 2 decision-making when they override their System 1 thinking (Bate *et al.*, 2012; Wieringa and Greenhalgh, 2015; Gabbay and le May, 2016). Using System 2 takes time and requires the clinician to research the problem so that they can then make an informed decision (Bate *et al.*, 2012). In comparison, System 1 processing is quick and intuitive and enables them to make a person-centred diagnostic or treatment decision without needing to consult more widely. Shortcuts used to aid CDM have been described by psychologists as 'scripts', 'heuristics', 'rules of thumb' and 'mindlines' (Andre *et al.*, 2002; Gabbay and le May, 2004; Bate *et al.*, 2012). I specifically discuss clinician use of 'mindlines' in the findings of my research, rather than the other shortcuts clinicians use.

Studies have found that clinicians refer to 'mindlines', as well as 'rules of thumb', and 'heuristics', for scenarios they are familiar with (Gabbay and le May, 2004; Wieringa and Greenhalgh, 2015), and as such, when they cannot use these, e.g. for questions about new or unfamiliar medicines, they seek information elsewhere (Gabbay and le May, 2004; Grant, Sullivan and Dowell, 2013; Wieringa and Greenhalgh, 2015; Gabbay and le May, 2016). 'Mindlines' have been described as the clinician's personal formulary or 'knowledge-in-practice-in-context'. They consist of 'tacit' knowledge, which is accumulated over years as a result of seeking specialist advice and discussion with others, such as practice pharmacists and GP colleagues (Gabbay and le May, 2004; Grant, Sullivan and Dowell, 2013; Gabbay and le May, 2016). To be able to rely on their 'mindlines' and make appropriate prescribing decisions, clinicians need to keep up to date via continuing professional development (CPD), discussions with specialist colleagues and reading updated clinical guidelines (Gabbay and le May, 2004; Gabbay and le May, 2016). However, as I have already mentioned, keeping up to date is difficult to do.

Clinicians are thought to use their wider 'community of practice' to help keep themselves up to date (Gabbay and le May, 2004; Lomas, 2007; Soubhi *et al.*, 2010), although learning may not be intentional. First described by Lave and Wenger in 1991 as "groups of people who share a concern or a passion for

something they do and learn how to do it better as they interact regularly" (Lave and Wenger, 1991; David, 2014). They are a means of spreading knowledge within a group and develop when people with an interest in a subject or area collaborate over an extended period of time, sharing ideas and strategies, and finding solutions (Wenger, McDermott and Schnyder 2002; David, 2014). It is defined by a shared domain of interest (e.g. GPs providing expert generalist practice, clinicians with an interest in paediatrics, self-care). Members interact and engage in shared activities, help each other, and share information with each other and build relationships. Practice is developed by problem solving, requests for information, seeking the experiences of others, coordination and synergy, discussing developments, visiting other members, mapping knowledge and identifying gaps (Wenger, McDermott and Schnyder 2002; David, 2014).

Meanwhile, various studies have attempted to understand GP prescribing and decision-making (Armstrong, Reyburn and Jones, 1996; Ali Murshid and Mohaidin, 2017). Several theoretical models of prescribing decision-making have also been proposed, but as these were pharmaceutical industry studies, it is not surprising that these theoretical models on prescribing and decision-making were developed around the effects of pharmaceutical marketing factors, such as drug information availability, branding of drugs, sales, and medical representatives. The main aim of these studies was to develop theories to try to understand what factors influence GP prescribing and they are summarised in a recent review (Ali Murshid and Mohaidin, 2017). As well as these existing theories, the Ali Murshid (2017) review also proposed a new model considering pharmacy influencing factors, not previously described in prescribing decision models. These pharmacy influences on prescribing clinicians are based on various theories, including Persuasion theory, Buyer Behaviour Stimulus-Response theory, Agency theory, Social Power theory and Planned Behaviour theory. These five theories and how they link to pharmacy factors are described in the new model by Ali Murshid (2017) and are briefly outlined below as they are relevant to my study findings.

Firstly, Persuasion theory (Dainton, 2004) is based on the interaction between cognition and emotion and consists of four dimensions, the sender of information, the receiver, the exchange (interactive or active) between the sender and the receiver and modification in behaviour (immediate or delayed). While in Buyer Behaviour Stimulus-Response theory (Howard and Sheth, 1969), the doctor i.e. the 'buyer', is influenced by various stimuli from drug marketing and other influences such as the patient and the pharmacist (Ali Murshid and Mohaidin, 2017).

Next, Agency theory has been linked to decision-making (Bendickson *et al.*, 2016). This theory considers the relationship between two parties, where the first party (the principal) relies on the second party (the agent) to perform certain actions e.g. doctor/patient, pharmaceutical company/doctor, pharmacist/doctor. This theory also considers the patient characteristics in terms of requests for the medicine and patient expectations (Ali Murshid and Mohaidin, 2017).

Whilst the theory of Social Power concerns the premise that an individual has the power to change the behaviour of another (French and Raven, 1959). Factors that may influence prescribing decisions are the pharmacist as an expert power, pharmacist-physician collaboration and trustworthiness (Ali Murshid and Mohaidin, 2017). The experts in that field e.g. pharmacists about new medicines, may therefore be perceived by the doctor to have more knowledge and thus have the power to influence them (Ali Murshid and Mohaidin, 2017).

Finally, Planned Behaviour theory relates to attitude (degree of like or dislike) for something, personal, subjective norms and perceived behaviour control (Ajzen, 1991). Perceived behaviour control is based on the perception of the individual about whether the behaviour is easy or difficult. This individual perception is thought to hinder or facilitate prescribing. The pressure or expectation to perform e.g. by the patient or pharmacist, is linked to Planned Behaviour theory (Ali Murshid and Mohaidin, 2017).

While the above theories have been linked to prescribing per se; within decision-making theory, it is thought that GPs accumulate a variety of 'cues'

or signals which cause a change in prescribing behaviour (Armstrong, Reyburn and Jones, 1996). The study by Armstrong *et al* (1996) describes three models of prescribing change, which the authors called the 'accumulation model', the 'challenge model' and the 'continuity model', which I now explain as it is relevant to my study findings. The 'accumulation model' involves reading about something, and is particularly relevant if it is read or seen to come from different independent, trusted sources e.g. Drug and Therapeutics Bulletin® or hospital specialist clinician. Personal experience of treating an illness or using a medicine also informs this model of change. Whereas in the 'challenge model', change occurs as the result of a major clinical issue or aversion of such. Other challenges include changes to medicines by colleagues who are perceived to be more clinically up to date or via the unexpected success of a treatment. Finally, changes occur in the 'continuity model' because the prescriber is willing to change as they have already seen information which means something to them. For example, they have read about the mode of action of a new medicine, which seemed logical to treat a particular condition, or are prepared to change because of cost pressures. For all these changes to be maintained, positive reinforcement is required from several directions, such as discussion with respected clinicians, or feedback from patients themselves.

Prescribing decisions are complex and multifactorial (Gabbay and le May, 2016), but despite prescribing being a core activity for GPs, prescribing behaviour is reportedly wide-ranging (Grant, Sullivan and Dowell, 2013). This was found in a study that tried to understand how clinicians make prescribing decisions for complex cases (Sinnige *et al.*, 2016). Findings were that there was wide variation between clinicians in their decision-making about medicines. When GPs were prescribing, initially they developed a medicines management strategy, which they described as deciding on prescribing goals and using decision support tools. However, for each clinical vignette the medicines management strategy varied between GPs, with different primary goals based on assessing clinical value and the original reason for the appointment, and varying numbers of treatment goals. GPs approached these goals either simultaneously or step-by-step. Prescribing objectives identified were to define and prioritise treatment goals with the patient; decide goal(s)

for primary concern; and to adjust prescribed medicines in line with the primary treatment goal. They considered patient complexity in terms of the number of medicines they were taking, doses and multiple morbidities, and expressed a more pragmatic approach and less adherence to clinical practice guidelines if the patient was older.

Patient factors considered by clinicians were quality of life, age, vitality, prognosis, life expectancy, the patient's own views and preferences about their treatment (Sinnige *et al.*, 2016). However, GPs were unsure of the best approach to medication management and indecisive about making treatment decisions in complex patients with polypharmacy, especially when there were several prescribing options, and also felt unsure about stopping or changing medicines. Needing to search for information and wanting to find out what other prescribers would do were reasons GPs gave before they were able to make complex prescribing decisions. In another study by Bradley (1992), GPs described feeling discomfort around prescribing, particularly when they felt ignorant or uncertain about management of the patient and that they were not living up to their own expectations. They also had concerns about treatment appropriateness and drug toxicity (Bradley, 1992). These factors describe the difficulties faced by clinicians and why there is the potential for them to seek advice from elsewhere, such as MI Services.

Research about the various prescribing influencing factors, particularly those perceived by GPs is relatively unexplored (Grant, Sullivan and Dowell, 2013). However, the authors of the Grant study have developed a conceptual framework for prescribing decisions which showed that clinicians made 'macro-prescribing' and 'micro-prescribing' decisions based on a combination of factors, and that they used prescribing 'mindlines' (Grant, Sullivan and Dowell, 2013). It was found by Grant *et al* (2013) that GP macro-prescribing decisions are informed by research evidence e.g. guidelines and the more subtle, 'soft' governance methods, which include practice pharmacists, formulary/ prescribing indicator reports (Sheaff *et al.*, 2004) and practice values. These can be used for the average patient with one medical condition only or a single medicine e.g. treatment of hypertension. Whereas their micro-prescribing decisions are about the individual patient, and based on the

views of the patient, their preferences, circumstances and their multiple medical conditions. That is, they relate to person-centred care and SDM. Macro-decisions inform micro-decisions, whereas clinicians use their prescribing 'mindlines' to inform their micro-decisions (Gabbay and le May, 2004; Grant, Sullivan and Dowell, 2013).

As well as having their own individual 'mindlines' based on their experience, preferences and values, studies have found that clinicians develop 'collective' prescribing 'mindlines' within their 'community of practice' (Grant, Sullivan and Dowell, 2013; Gabbay and le May, 2016). They do this via meetings with other GPs or pharmacists to discuss patients with complex problems, provide an expert check and allow exchange of ideas and information, with all these considered important. This accumulated experience of having a discussion with other clinicians has been described as a facilitator to making prescribing decisions (Sinnige *et al.*, 2016).

In summary, prescribing is a complex decision-making process, as many factors need to be considered, which is compounded by the need to make prescribing decisions for increasingly complex patients. Clinicians appear to do this by using prescribing 'mindlines' and micro/macro decision-making processes which are informed by the individual patient, prescribing guidelines and other clinicians. We need to try to understand how provision of MI advice might help support these processes. In the next section(s), I discuss what clinicians might do when faced with a prescribing dilemma, that is, how they answer MRQs if they cannot use their own knowledge, which means using digital and human resources, including the MI Service.

How clinicians answer questions about medicines

Clinicians field many questions about medicines and have access to a variety of resources to help them find answers (Clarke *et al.*, 2013; Del Fiol, Workman and Gorman, 2014), but if they are unable to use their existing knowledge to make prescribing decisions, they may search a range of information sources, and in some cases have been unable, or even unwilling to access information to answer questions raised (Brassil *et al.*, 2017). Yet clinicians need to find

answers to medicines questions, which may arise as part of the medicines optimisation process (RPS, 2013).

It is inevitable that questions occur during patient consultations, with studies finding that clinicians tend to under estimate the number of questions raised (Ely *et al.*, 2000; Dhaliwal, 2013; Del Fiol, Workman and Gorman, 2014). A review about the types of questions raised by clinicians during patient care decision-making found that a third of questions were about medicines (Del Fiol, Workman and Gorman, 2014). Overall, we think that clinicians try to answer about half of all the questions they are asked and of these, answer about three quarters (Del Fiol, Workman and Gorman, 2014).

Besides the patient or the clinician raising questions, they may also occur via the clinician's Clinical Decision Support System (CDSS). In this case the clinician is alerted to a problem which they are unaware of or may be uncertain about how to manage; particularly if the answer cannot easily be found using standard resources available to them. In fact, decision-making support tools with on-demand prescribing aids (e.g. linked to prescribing guidelines) in the electronic medication record (EMR) system were preferred to those that flagged issues automatically (Sinnige *et al.*, 2016). GPs in this same study also said that although they found online risk tools practical and valuable, they found it difficult to know which to choose because of patient heterogeneity e.g. CHA2DS2-VASc tool for assessing stroke risk in patients with atrial fibrillation or CVD risk assessment tool. This illustrates that although digital information systems are useful tools for clinicians, they do not always provide a patient specific answer, whereas the MI Service is able to do this.

To help clinicians answer questions, a wealth of digital resource is available, for example, First Databank® or Script-Switch®, to which clinicians can subscribe (Chana, 2015). Clinicians can also readily access key reference texts e.g. the BNF; Monthly Index of Medical Specialities (MIMS); electronic Medicines Compendium (eMC), and local on-line formularies. Other searchable websites are clinical guideline websites e.g. NICE, SIGN, or PubMed, Cochrane; NICE Evidence Search, or a subscription-based medicines database, such as Medicines Complete® or Up-to-Date®. All these are useful

resources for clinicians, but only if they actually choose to use them and are able to search them correctly. A 2015 Cochrane review of clinician use of digital health information (DHI) via a range of platforms (laptop/desktop computer/printed information/different search interfaces/plus training) to improve clinical practice and patient care found that when DHI was supported with training, clinicians used them more often (Fiander *et al.*, 2015). However, there was no evidence that it improved clinical practice or patient outcomes, suggesting a need to better understand why clinicians are reluctant to use DHI and ways to improve use. This also highlights why we need to understand how they use the MI Service.

As I have already discussed, clinical questions sometimes go unanswered, and there are various reasons for this (Brassil *et al.*, 2017). Some barriers reported by clinicians are lack of time, inadequate searching skills, difficulty keeping up to date and thinking that the answer cannot be found (Bourne, 2007; Zwolsman, 2012; Clarke *et al.*, 2013; Del Fiol, Workman and Gorman, 2014). This is unsurprising as in clinical practice, a UK GP has less than 10 minutes per patient consultation (Irving *et al.*, 2017), and these constraints mean that clinicians do not have the time to conduct in-depth, complex searches whilst with the patient. Instead they may resort to doing a quick internet search, which may link to less reliable sources of information, look into providing an answer later i.e. outside surgery hours, seek additional help from a colleague (Clarke *et al.*, 2013), or use a specialist clinician, community or practice pharmacist to help them resolve the problem (Rutter, J. and Rutter, 2004; Rutter, P., Warren and Rutter, 2009; Clarke *et al.*, 2013).

Answering complex questions is difficult and time consuming and while clinicians do access DHI, the information needs to be easy to find and use, otherwise they ask their colleagues, whose responses may not be based on current evidence (McGettigan *et al.*, 2001, Clarke *et al*., 2013; Brassil *et al*., 2017). Some have suggested a need for someone experienced in searching for information to provide them with the relevant information or tailored user-friendly summaries provided by experts (McKenna, Ashton and Keeney, 2004; Trevena *et al.*, 2007; Clarke *et al*., 2013; Brassil *et al.*, 2017). This is where the MI Service potentially fits, as they have access to a wider range of

resources, are perhaps more confident using and interpreting them, and can help modify the data to suit the needs of the patient. Ultimately, the MI Service is available to help clinicians by finding answers to their more complex questions which require information retrieval skills, including deciding on a search strategy, using their searching skills, then reviewing the information, while applying it to the question and the patient themselves.

In summary, clinicians field many clinical questions, a high proportion of which are about medicines. While they have access to DHI, including systems such as CDSS, they may be reluctant to answer their own MRQs, resulting in some of these going unanswered. Clinicians seem to preference asking someone else for person-centred medicines advice, particularly for complex cases. Thus, there is a need to understand how the MI Service is used by clinicians to help them answer their complex questions. Next, I discuss medicines information provision by pharmacy; this includes providers of pharmacy services in primary care and MI Services.

Pharmacy staff working in primary care pharmacy services are obvious providers of medicines information and advice, with staff in community pharmacies easily accessible to provide advice to clinicians, patients, carers and members of the public (RPS, 2016). Other pharmacists work in primary care as prescribing advisors, for example, in England they work for Clinical Commissioning Groups (CCGs) and they too provide medicines advice to other clinicians. Practice pharmacists, including those with prescribing rights, are also employed by an individual GP practice or group of practices and there are now pharmacists with prescribing rights working alongside GPs (NHS England, 2015; RPS and RCGP, 2015).

In an ideal world all practising pharmacists should be able to provide a consistent level of advice about medicines to help clinicians, but in reality, the ability of these pharmacists to provide such advice is not achievable or practical. Like other clinicians, pharmacists in primary care may not have access to resources (Rutter, J. and Rutter, 2004; Chui and Stone, 2014), possess the relevant skills or expertise (Rutter, J. and Rutter, 2004; Ogunbayo *et al.,* 2017) and have limited time to provide this advice (Tarn *et al*., 2012; Elaro *et al*., 2015), as they also have to manage their own patient workload.

Although, most can probably answer more straightforward questions using their core pharmacy knowledge and by accessing key medicines resources, such as the BNF (Joint Formulary Committee, 2018), due to differences in experience, knowledge, skills, available time and resources, pharmacists and their staff may provide variable advice in response to questions asked (Rutter, P., Warren and Rutter, 2009; Tarn *et al*., 2012; Elaro *et al*., 2015; Ogunbayo *et al.,* 2017). It is therefore not always appropriate for all pharmacists to answer the more complex medicines questions themselves, and they too might need more specialist help from other services, such as MI.

Pharmacy-led MI Services are available as a resource for clinicians and are the focus of this research. Since this study is about clinician use of MI Service advice, and because my review of relevant MI studies includes those conducted in the UK, as well as worldwide, I now explain how MI Services are organised to provide context for the reader. I also relate my research findings, discussion and conclusions to the provision of NHS MI Services in the UK.

In the UK, NHS MI Services (previously called Drug Information, but referred to as MI Services in this thesis) were originally developed in the 1970s to help clinicians in secondary care assess new medicines and to help 'improve the quality of prescribing in general practice' (Calder *et al.*, 1981). They were set up prior to the availability of the internet and located within hospital pharmacy departments in secondary care (Calder *et al.*, 1981). I mention them here because MI Services need to try to better understand how MI advice influences clinicians and the care of their patients for future service development and have struggled to do this over the years.

After opening of these first centres, almost all hospital pharmacy departments had a dedicated MI Service, with MI recognised as a speciality within pharmacy, providing advice about medicines across the full range of clinical disciplines. Although, primarily a service for health professionals, in some cases it is available to recently discharged patients and outpatients via dedicated helplines (Badiani *et al.*, 2017; Bramley, Innes and Dass, 2018). MI staff, who include pharmacists, pharmacy technicians and life-science graduates, have additional expertise and training in questioning skills,

searching specific websites and databases, literature searching, while interpreting and assimilating information to provide tailored advice for clinicians and their patients (UKMI, 2007; UKMI, 2017).

In 2010, UK MI Services provided 300,000 responses to MRQs from primary and secondary care (Rehman, 2010), with a high proportion generated from secondary care. This bias towards the hospital sector is largely historic as the majority of MI centres were, and still are, located within hospitals. Medicines questions can be about a specific patient, a group of patients or about management of a population in a geographical location and about anything to do with medicines. Ranging from *'I have a patient with swallowing problems, can all their medicines be crushed and put down a feeding tube?'* to *'I need to help a patient decide how she wants to manage her migraine during pregnancy, can you give me some advice?'* In particular, the service caters for complex patients and/or questions requiring difficult, time-consuming searches or answers that are awkward to find.

In 2017, there was a UK network of approximately 194 local hospital-based centres supported by 16 regional MI centres (11 England, 1 Wales, 4 Scotland) providing a variety of services to primary and secondary care across the 210 acute and mental health Trusts (NHS Confederation, 2016). Most MI centres primarily provide advice to their local hospital(s), although services do extend beyond this, for example, drug evaluations and input into local prescribing committees, training other staff in MI skills and adverse event monitoring. Whereas regional MI Services provide support to other MI centres, and a medicines advice service to primary care. The larger centres also have additional in-house clinical expertise and resources to offer specialist medicines advisory services in key clinical areas, such as complementary medicines, medicines in dentistry, medicines in pregnancy and lactation, medicines in renal failure, HIV and AIDS, oncology, psychiatry and porphyria. A list of regional MI specialisms can be found in the BNF.

All these services form a virtual network called UK Medicines Information (UKMI), whose remit is to apply evidence-based principles in the provision of impartial, evaluated information. In an attempt to respond to the needs of clinicians and their patients, regional MI Services also collaborate to produce

pre-emptive, active material to help clinicians answer MRQs themselves. Most of these materials are now located on the Specialist Pharmacy Services website (UKMI, 2016), and include a range of medicines Questions and Answers (Q&As) (*What medicines can be used to treat hypersalivation?*); a fridge database (*Our fridge has broken, is it still safe to use all the vaccines?*); the compliance aids database (*Is this medicine OK to be taken out of the original packaging and put in a blister pack?*); omitted and delayed medicines tool (advice about what to do if specific doses of medicines are missed); and patent expiries database (to help medicines management teams plan when branded medicines will be superseded by cheaper generics). Other materials produced by this network include the 'Prescribing Outlook' horizon scanning portfolio, which provides clinical and cost summaries of 'pipeline' and newly launched medicines likely to impact the NHS and patients; NICE Bites (concise monthly summaries of key NICE Guidelines) and product safety assessments (about safety in use of new medicines and/or formulations, primarily for use by Medication Safety Officers). More recently, a new role is for regional MI Services to provide advice and support to the newly formed Regional Medicines Optimisation Committees (NHS England Medical Directorate, 2017).

MI services are not unique to the UK, for example they have been available in the US since the 1960s (Rosenberg, J. *et al.*, 2004). However, the scope of provision varies from country-to-country and are described here as I discuss studies conducted by non-UK services in my review. In the US, MI Services are provided by a range of institutions, including colleges of pharmacy and health care providers. In 2008, a US survey found there were 75 MI centres, although as in the UK, numbers are declining as clinical pharmacists are now required to answer questions themselves (Rosenberg, JM *et al.*, 2009; Gabay, 2017). There are also academic MI centres located in colleges of pharmacy or university hospitals providing training for pharmacy students in MI skills (Brand and Kraus, 2006).

In Finland, MI Services are provided via a call centre based within a university pharmacy, and operated by the School of Pharmacy (Pohjanoksa-Mäntylä *et al.*, 2008). Whereas in Canada, MI Services are described as usually hospital-based, with some serving the base institution, and others covering a wider

geographical area on a fee-for-service basis (McLean, 1996; The Ottawa Hospital Drug Information Service, 2016). In Germany, the pharmacist run national MI Service was set up in 1988 by the Federal Union of German Associations of Pharmacists, primarily for community pharmacists but also for other clinicians in primary care with funding provided by the member organisations (Maywald *et al.*, 2004). As the availability of medicines has increased, MI Services have also been set up in developing countries, for example, in Khartoum State in Sudan an MI Service was set up by the Pharmacy Directorate on behalf of the Ministry of Health in 2000 (Fathelrahman *et al.*, 2008). In short, similar services are provided in other countries, and although base locations, enquirer types and funding streams differ, they are all pharmacy-led services providing medicines advice to clinicians.

In summary, when clinicians raise medicines questions, pharmacy staff can provide a range of medicines advice, but like other clinicians they are also limited by time, skills and resources. This is why formal MI Services are available in the UK and worldwide to provide support to clinicians in the form of proactive information and reactive, person-centred advice. In the UK specifically, NHS changes mean pharmacy services are changing with greater focus on primary care, including changes in MI Service provision. This means there is an even greater need to understand the effect of MI advice on clinicians and their patients. In the next section, I discuss these recent NHS changes, why we need to know more about the effect of MI advice, the problems regarding lack of clarity and consistency around terms used to evaluate the effects of MI advice, and finally include my review of published MI studies that have attempted to evaluate the effects of MI advice on clinicians and patients.

Why we need to know about the effects of Medicines Information advice on clinicians and patients

Health care and the NHS has and continues to evolve against changing economic and political landscapes, which has consequently affected MI Services. This is apparent with modern-day austerity measures leading to budget constraints across all sectors. Recently, the configuration of health

services in England has changed (The Kings Fund, 2016) and is still changing. The move is towards decentralised commissioning of health services, either via local CCGs in primary care or centrally via NHS England (NHSE). The majority of services are commissioned via CCGs, with NHSE commissioning GP services and the less common, more specialist services. The NHS Five Year Forward View (NHS England *et al.*, 2014) and the Carter Report (Lord Carter of Coles, 2016) both aim to make the NHS less focussed on the division between primary and secondary care, with a blurring between the two areas as patients are cared for in ambulatory care. Consequently, hospitals will become more specialised and treat only those who need to be in an acute setting e.g. those requiring surgery, complex diagnoses and assessments. This all means the roles of health professionals in hospitals and primary care are changing.

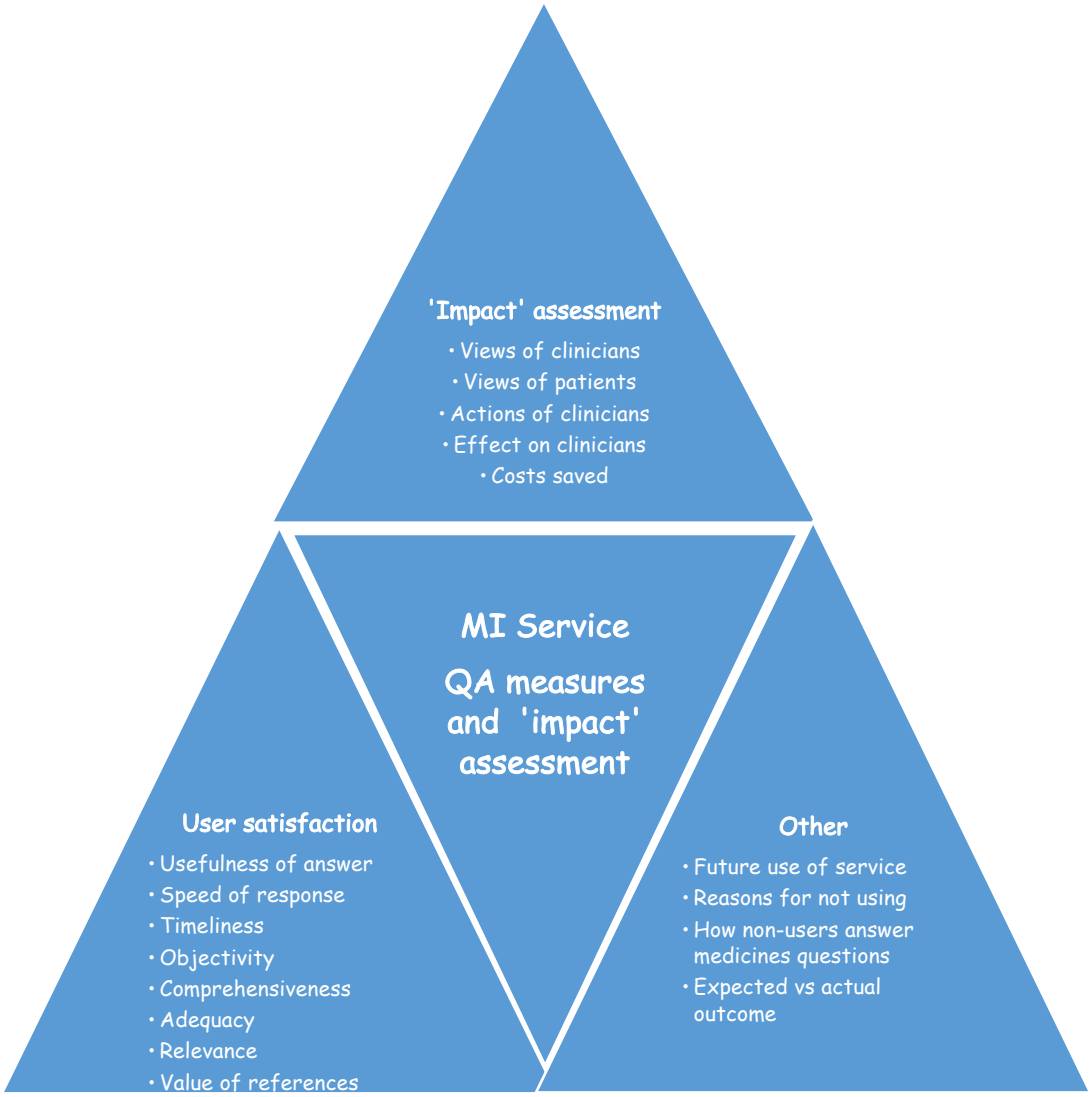
The Carter Report wants all hospital pharmacists to have direct contact with patients and to have greater roles in medicines optimisation (Lord Carter of Coles, 2016). Also, changes in Urgent and Emergency Care aim to reduce unnecessary visits to Accident and Emergency departments, with patients managed and treated closer to home without admission to hospital. This aim is set to be achieved with better management of patients with LTCs, by development of emergency treatment plans and supply of medicines for acute exacerbations to avoid hospital admission, and greater utilisation of non-medical prescriber (NMP)-led clinics (UEC Review Team and ECIST, 2015). As such, the enactment of recommendations from these key documents will have profound effects on the delivery of patient care and the move towards greater provision of care out of hospital, means there will be a larger pool of health professionals and prescribing clinicians working in primary care. Thus, as the information needs of clinicians are likely to change, the relationship MI Services have with their customer base, and the services and information offered will need to change, with a focus on provision of more services to primary care.

Historically, regional MI Services in England have been funded via local commissioners in primary and secondary care, with additional government funding. In 2012, English regional MI Services were reviewed, with funding arrangements subsequently altered so that they are now commissioned by

NHS England (NHS England Medical Directorate, 2014) under the umbrella of the Specialist Pharmacy Service (SPS, 2016). Whereas local MI Services in England are primarily funded by their host organisation, although this model of funding only looks set to continue in the short-term. As the Carter Report requires more pharmacists to be patient-facing (Lord Carter of Coles, 2016), hospital chief pharmacists are beginning to set up service level agreements (SLAs) with regional MI Services to deliver specific service packages, such as MI skills training and enquiry answering. This means the number of local MI centres are likely to decline. Due to this changing environment, it is now even more important that the value of MI Services is better understood by those that fund the service, so that it can continue to be provided.

However, it is not easy to evaluate the 'impact' i.e. the effect of MI Services on patients and clinicians. Generally most published studies about MI Services have shied away from measuring effect and concentrated on service evaluation, usually conducted as part of MI centre quality assurance (QA) requirements and almost exclusively used self-administered surveys based on a positivist, quantitative paradigm (Repchinsky and Masuhara, 1987; Schjøtt, Pomp and Gedde-Dahl, 2002; Bertsche, Hämmerlein and Schulz, 2007; Fathelrahman *et al.*, 2008; Frost Widnes and SchjØtt, 2009; Hedegaard and Damkier, 2009; McEntee *et al.*, 2010). These various means of evaluating MI Service quality and 'impact' are summarised in Figure 2.1 to show the range of measures used and are discussed below. Frequently, these studies have measured user satisfaction as it is relatively easy to define and quantify (see Figure 2.1). The tendency has been to evaluate this based on the usefulness of the advice provided in writing or the telephone. A variety of measures for determining usefulness have been used and include: speed of response (Maywald *et al.*, 2004); timeliness (Melnyk, Shevchuk and Remillard, 2000; Schjøtt, Pomp and Gedde-Dahl, 2002; Hedegaard and Damkier, 2009); objectivity (Melnyk, Shevchuk and Remillard, 2000); comprehensiveness (Schjøtt, Pomp and Gedde-Dahl, 2002); adequacy and/or relevance of the answer (Maywald *et al.*, 2004) and value of the references included with the answer (Schjøtt, Pomp and Gedde-Dahl, 2002).

Figure 2.1 MI Service advice quality assurance measures and 'impact' assessment



QA= quality assurance vs=versus

Other assessments of user satisfaction and evaluation of service quality (see Figure 2.1) have included questions about use of the service for future MRPs (Melnyk, Shevchuk and Remillard, 2000; Bramley *et al.*, 2013) and asking users about actual clinical outcome compared to expected outcome (Melnyk, Shevchuk and Remillard, 2000). Evaluation of non-users of the MIS has also been conducted, with questions asked about why they do not use the service and how they answer MRPs (Rutter, J. and Rutter, 2004).

As already mentioned, it is increasingly important to try to better understand how MI advice influences clinicians and the care of their patients in the current economic, evidence-based climate. Consequently, MI research has aimed to

evaluate the effect of MI advice on clinicians, patient care and patient outcomes (Hands, Stephens and Brown, 2002; Spinewine and Dean, 2002; Bertsche, Hämmerlein and Schulz, 2007; Frost Widnes and SchjØtt, 2009; Hedegaard and Damkier, 2009; Bramley *et al.*, 2013; Innes, Bramley and Wills, 2014), and so this is the focus of my review of MI studies. These various means of assessing 'impact' are also shown in Figure 2.1. I am now going to discuss the difficulties with the terms impact, patient care and patient outcome, and use of these when evaluating the effects of MI advice.

Problems evaluating the effects of Medicines Information advice

When trying to evaluate the effects (impact) of MI advice, investigators have considered both patient care and patient outcome. First, I want to clarify the terms 'impact', 'patient care', and 'patient outcome' because definitions of these terms are blurred. In the context of my review of MI studies, investigators have likewise used different interpretations of these terms, with regard to their meaning and what to evaluate.

The word 'impact' as defined in the Oxford dictionaries is 'a marked effect or influence' (Oxford University Press, 2018). However, as described by health librarians in their evaluating impact toolkit, the term 'impact' is vague and can mean different things to individuals; which makes measuring such a nebulous term difficult and almost impossible to define (Health Education England, 2014). It certainly seems popular to include the word 'impact' in the title of health care research studies, with variable measurements used. For example, a pharmacist-led study entitled 'Assessing the impact of a targeted pharmacist-led anticoagulant review clinic' (Dowling *et al.*, 2016) evaluated impact by checking patient satisfaction using a survey with pre-defined items, monitoring performance against agreed standards and calculating cost effectiveness. So, in this study the measures of impact were broad and varying; this has also been seen in the MI studies I reviewed.

The term 'patient care' is probably the easiest to define and a simple definition is 'services rendered by members of the health profession and non-professionals under their supervision' (National Library of Medicine, 2019). Although, within the context of MI studies, Bramley *et al* (2013) defined

'patient care' more specifically as 'health care interventions intended to preserve or improve a patient's mental or physical health'. Certainly, it is my view that for a service to have an effect on patient care, it does not have to be as specific as an intervention having a direct effect on the patients' health, as stated above. For example, the provision of education, counselling or information may not preserve or improve a 'patient's mental or physical health' as defined in Bramley (2013), but still has the potential to have a beneficial effect on the patient by improving patient medication adherence and wellbeing, providing reassurance and giving them the confidence to ask questions about their treatment.

In comparison, the definition of patient outcome is more problematic. In more recent MI research, 'patient outcome' has been described as a 'change in the patient's health status that could be a consequence of an intervention in the preceding health care' (Bramley *et al.*, 2013; Innes, Bramley and Wills, 2014), and this was adapted from that used in the Melnyk study (Melnyk, Shevchuk and Remillard, 2000). Thus, measures used to determine patient outcome are wide ranging, for example, a UK patient survey used all the following terms to ask about patient outcome: patient understanding; patient concerns; information provision to patients; ability to be involved in choice, dose, care; ability of the clinician to explain to the patient risks/benefits; pain control and guideline use (Leatherman and Sutherland, 2007). The MI study by Bramley (2013) actually used some of the patient outcome measures from the patient study above and examples of patient outcome measures used in other MI studies, include 'avoidance', e.g. avoided abortion (Bertsche, Hämmerlein and Schulz, 2007; Frost Widnes and SchjØtt, 2009), or a visit to their clinician (Joseph, Dean Franklin and James, 2004) and 'improvement', e.g. improved symptoms (Bramley *et al.*, 2013).

Coincidentally, a British Standard for impact assessment is now available for library services in the UK. This describes 'impact' as the 'influence of libraries and their services on individuals and/or on society' and 'the difference or change in an individual or group resulting from the contact with library services' (ISO, 2014). Moreover, these services say that changes (or impacts) as a result of information provision may be intangible and so difficult to

quantify. As I also found when reviewing published MI 'impact' studies, it is difficult to separate MI effect from other influencing factors and to prove the effect was due to provision of MI advice. This means it may only be possible for information services to contribute to an impact (e.g. length of stay, patient care) rather than be solely responsible (Health Education England, 2014). Thus, MI Services need to be aware of the issues when designing studies to evaluate effect of MI advice on clinicians and patients, by clearly defining what they mean by impact and the measures used.

An overview of studies evaluating the effects of Medicines Information Service advice

For my research the main aim of this literature review was to identify and review published research evaluating the effects of MI Service advice on clinicians and patients, and then to identify topics for further research. I conducted my review by systematically searching the literature and collating all relevant published MI studies. I then summarised the aims and objectives, design, methodology and methods, and results of these studies. Finally, I thematically reviewed and critiqued these studies, identifying gaps and explaining the reasons for doing my study.

Methods used in this review of Medicines Information studies

The Embase® and PubMed® databases were searched from their respective start dates for original English language research articles (journals and conference proceedings only), spanning both primary and secondary care. Those papers from the two published reviews (Hands, Stephens and Brown, 2002; Spinewine and Dean, 2002) that met the criteria for inclusion (Table 2.1) were also considered.

Table 2.1 Literature search inclusion and exclusion criteria

Inclusion criteria	Exclusion criteria
All published studies which attempted to evaluate the effect and outcomes of MI Service advice	Unpublished studies (including PhD theses)
Date range: PubMed 1966 to Feb 2019 Embase 1974 to Feb 2019	Primary research not related to the subject area
Primary and secondary care	MI studies which only evaluated customer satisfaction (health care professional and/or public)
Any articles published as a journal article; congress proceedings; clinical trial and case reports	Any other studies about the MI Service
English language only	Studies evaluating the effect and outcomes of other medicines information resources
	Non-English language

I have summarised the searches, search terms and number of studies returned in Table 2.2. I then reviewed the abstracts of articles to decide if the studies were relevant to my research question, and included them if they were about an MI Service and evaluated the effects or outcomes of MI advice. I also hand searched the reference lists of relevant studies for any additional publications.

Table 2.2: Search strategy and results

Database	Search terms used			Number of hits
Medline (PubMed) [MeSH Terms*]	From 1966 to Feb 2019 Limited to human & English language Terms in "quotes" were free text			
Search 1	drug information services* (exp) AND	clinical pharmacy services* (exp) OR	community pharmacy services* (exp)	524
Search 2	"drug information" OR	"medicines information" AND	"service"	708
Search 1 AND Search 2	1069 hits			95 selected 19 not MI 68 MI but not relevant 8 relevant MI studies Cardoni 1978 Kinky 1999 Melnyk 2000 Maywald 2004 Bertsche 2007 Frost Widnes 2009 Hedegaard 2009 Bramley 2013
Embase [EmTree terms*]	From 1974 to Feb 2019 **Limited to human & English language Terms in "quotes" were free text			
Search 1	drug information* (exp) AND	information service* (exp)	616 (limit**) = 182	25 selected 3 not MI 19 MI but not relevant 3 relevant MI studies (1 new) Cardoni 1978 Melnyk 2000 Strobach 2015
Search 2	drug information* (focussed) OR "medicines information"	AND "impact" OR "outcome" OR patient care* (focussed)	554 (limit**) = 380	34 selected 2 not MI 23 MI but not relevant 9 relevant MI studies (4 new) Melnyk 2000 Joseph 2004 Maywald 2004 Frost Widnes 2009 Bramley 2009 Bramley 2013 Innes 2014 Strobach 2015 Bramley 2018

*Indicates a thesaurus term
Exp = term exploded
Studies in red are those included in my review, by first author

Findings of my review of Medicines Information studies

The literature search identified 1631 articles, of which 156 were MI papers with 19 eligible for inclusion (Figure 2.2). A summary of each paper is in Appendix 1.

Figure 2.2 Selection process of papers for review

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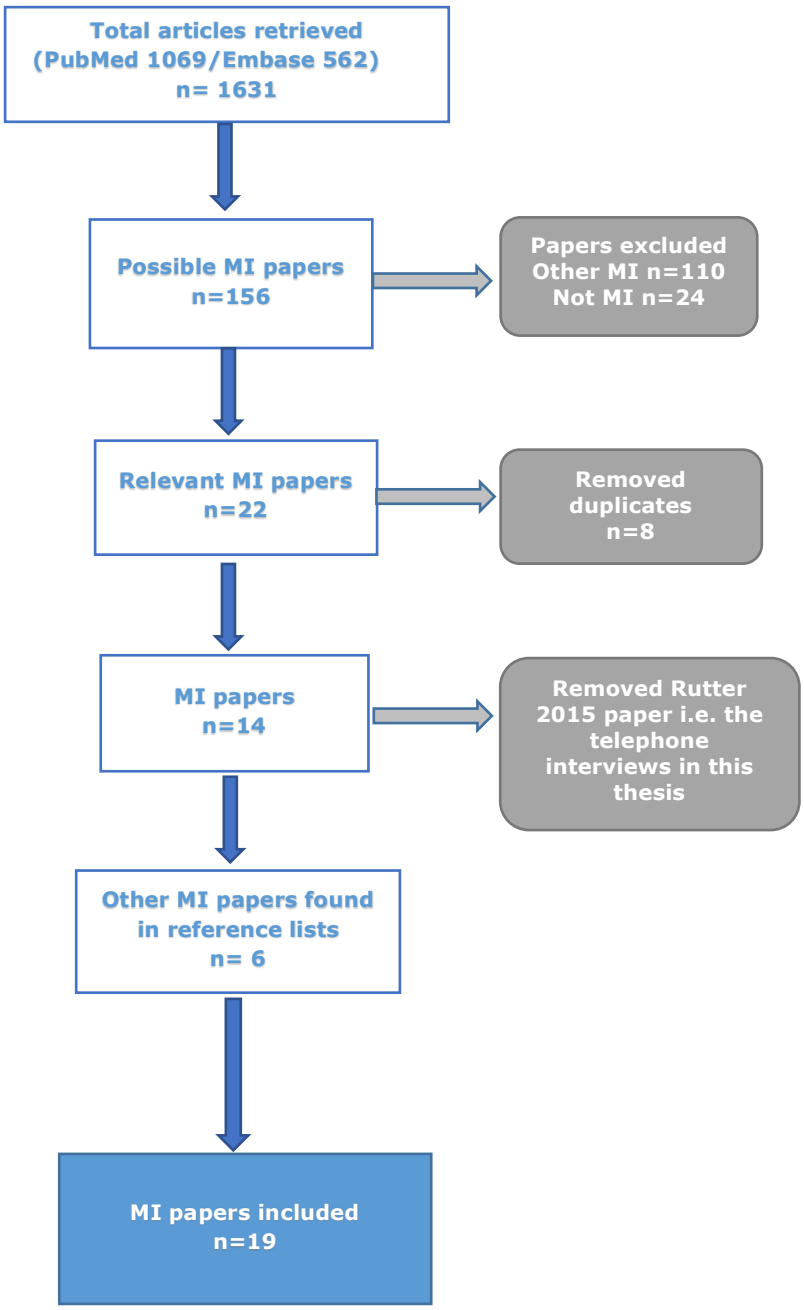


Previously, early MI papers were subject to two reviews (Hands, Stephens and Brown, 2002; Spinewine and Dean, 2002). The review by Hands *el al* aimed to establish clinical and economic impact of MI Services on patients (Hands, Stephens and Brown, 2002). Seven studies were included (six published articles and one unpublished document), in which Hands *et al* concluded favourable impact was reported in some studies but questioned the validity of their findings due to methodological limitations. The authors recognised at the time, that methods for assessing impact or patient outcome from MI advice were limited to prospective, open label cohort studies and that controlled trials were not possible. They suggested using a combination of methods (interviews, surveys) with the patient's clinician, the patient/carer, and reviewing medical notes to gather information about patient outcome. Whilst I agree this approach would result in a well-designed study, it would not be feasible in terms of time, logistics and costs to interview the prescriber, check medical records and then interview the patient, particularly as in my case being a part-time, self-funding PhD student. They also suggested there were other means of assessing impact on patient outcome, such as comparing desired outcome with actual outcome, which some studies have since tried to do. The review by Spinewine and Dean appraised nine papers, including three of the same papers found by Hands, to assess impact on patient outcome of passive information given to clinicians (Spinewine and Dean, 2002) and they also included a study by Golightly *et al* (Golightly *et al.*, 1988). The authors like Hands *et al* questioned the methodological rigour of the studies and therefore their findings. Their assessment of outcome and impact reported that only Stubbington *et al* and Melnyk *et al* attempted to assess actual impact rather than enquirer opinion of immediate patient outcome or anticipated outcomes (Stubbington *et al.*, 1998; Melnyk, Shevchuk and Remillard, 2000).

In addition, the Spinewine review helpfully discusses use of various endpoint measures, and explains that they are either process or outcome measures, as described by Donabedian (Donabedian, 1988; Spinewine and Dean, 2002). I agree with their explanation that in MI terms, process measures relate to things that happen during the course of producing an MI answer and include accuracy; clarity; relevance; completeness; timeliness; adequacy; usefulness; appropriateness; and objectivity. Although these tend to be easier to

measure, they do not necessarily influence the patient outcome and are really quality assurance indicators. In Spinewine, the authors suggest outcome measures which are a result of these processes and include examples such as use of information, action taken, patient outcome and outcome of cases. The authors suggest that outcomes should be compared before and after the introduction of the service, or in similar environments with and without the service. This is difficult to do with MI Services widely available in the UK, although a study has been completed comparing use of the service with non-use of the service by finding out what non-users did instead (Rutter, J. and Rutter, 2004).

In summary, both reviews were critical of the measures used and called for further studies to be conducted that were more robustly designed to allow outcome or impact to be better assessed. Thus, MI researchers have begun to focus less on QA indicators and more on outcome and impact as advocated by the two reviews. This review therefore attempts to assess MI research where outcome and/or impact has featured in the data collected, whether as the major objective of authors or as an element of their work. The majority of MI studies I found are mostly descriptive, of variable quality and with diverse results. This heterogeneity makes it difficult for me to compare studies and as such it was not possible to do traditional quantitative reviews, such as a meta-analysis.

Studies identified are non-experimental with a mostly cross-sectional survey design. Unfortunately, the Critical Appraisal Skills Programme (CASP) does not have a specific critical appraisal tool for this type of study, in the same way it has for randomised controlled trials (RCTs) and systematic reviews. Instead, I therefore used a tool produced by the Centre for Evidence Based Medicine (CEBM, 2014) designed to evaluate cross-sectional studies i.e. surveys. Although other checklists are also available, e.g. STROBE (Strengthening the Reporting of Observational research in Epidemiology), these are primarily designed to be used by authors writing publications rather than for reviewing studies, so I did not use them.

Nineteen studies were identified, although twelve of these also included QA measures, such as workload and user satisfaction, as well as assessing impact

(effect). As the focus of my review is around the effects of MI advice, I have not considered the QA aspects of these studies. The tables in Appendix 1 provide a summary of the aim and objectives, participants, design, duration, sampling, methods, outcome measures and findings for each study. I reviewed all 19 studies using the CEBM checklist, then summarised my findings under five main themes based on the included participants and the findings of each study, with further critical discussion about strengths and limitations under the headings; Design and methods, and Setting and sampling issues. Finally, I relate my findings to the two previously published reviews (Hands, Stephens and Brown, 2002; Spinewine and Dean, 2002), presenting my concluding thoughts concerning the need for further research and explain why there is a need for my study.

As stated earlier the variability in what constitutes impact is reflected in the 19 studies reviewed here, as all used a range of outcomes to try and gauge the effect of MI advice on clinicians and patients. For clarity and to illustrate the range of outcomes used, I have split them into three broad groupings: those which relate to patients; those used with clinicians; and numerical outcomes, such as costs saved. These are in Table 2.3 and Table 2.4. The effect of MI advice on patients was mainly evaluated by asking the clinician (asking the MRQ) about the patient outcome, although in some studies they asked the opinion of patients (Table 2.3). Other studies evaluated the effects of MI advice on clinicians themselves or used other measures (Table 2.4). All papers were reviewed where data relating to descriptions around impact/effect and outcome were mentioned. These were themed under five main headings, meaning some studies are discussed under one or more themes.
These are:

- Theme 1: views of clinicians about the effect of MI advice on patients
- Theme 2: actions of clinicians after receiving MI advice
- Theme 3: influence on their decision-making
- Theme 4: views of patients about the effect of MI advice
- Theme 5: process measures

Table 2.3 Terms used to evaluate the effects of Medicines Information Service advice on clinicians and patients

Based on:	Effect on the patient	Study (lead author)
Views of clinicians	Positive outcome	Melnyk
	Positive impact on patient care	Bramley 2013 Innes Stubbington
	Potential positive outcome	Bertsche Innes
	Improved patient care/improved outcome	Bramley 2013 Innes
	Affected patient outcome	Cardoni
	Expected patient outcome	Bramley 2009
	Improved patient care	Innes Melnyk
	(No) effect on care/outcome	Melnyk
	Patient understanding of medicines	Innes
	Enhanced adherence	Bertsche
	Considered patient concerns	Innes
	Patient reassured	Innes Stubbington
	Patient able to participate in choice about medicines/regimen/health care	Innes
	Prevented/reduced risk of treatment (defined as low/moderate/major)	Innes
	Improved symptoms	Bramley 2013
	Avoided interaction	Bertsche
	Reduced ADR/ reduced risk of ADR	Bramley 2013 Innes
	Avoided potential ADR	Stubbington
Views of patients	Effect on patient care	Melnyk
	Followed advice	Badiani Bramley 2018 Joseph
	Avoided/resolved MRP	Badiani Joseph
	Reassured	Badiani Bramley 2018
	Improved health	Bramley 2018
	Cure	
	Reduced symptoms	Joseph
	More/less anxious	
	Changed medicine/how taken	
	Obtained supply of medicines	
	Contacted clinician	
	Effect on wellbeing (general/physical/emotional/social)	
	Avoided a visit to their clinician	
	Believed they had an improved state of health	
	Felt able to discuss and/or minimise uncertainties	Maywald
	Gained confidence about their medicines	
	Gained knowledge to enable further discussion with clinician	

Table 2.4 Other terms used to evaluate the effects of Medicines Information Service advice

Based on:	Effect on the patient	Study (lead author)
Actions of clinicians	Optimised treatment e.g. changed a dose/frequency/form/duration	Bertsche Bramley 2009 Innes McEntee Strobach Stubbington
	Changed treatment	SchjØtt
	Changed a treatment to something else	Bramley 2013 Hedegaard McEntee Strobach
	Switched to a more suitable medicine	Bertsche
	Stopped treatment	Bertsche Bramley 2009 Cardoni Frost Widnes Innes McEntee Strobach Stubbington
	Did not start treatment	Bramley 2009 Frost Widnes Innes Strobach Stubbington
	Started treatment	Bramley 2009 Bramley 2013 Cardoni Frost Widnes Innes McEntee Melnyk Stubbington Strobach
	Continued treatment	Bramley 2013 Frost Widnes
	Monitored drug treatment e.g. TDM	Innes McEntee Melnyk Strobach
	Avoided abortion	Bertsche Frost-Widnes SchjØtt
	Reported ADR	SchjØtt Stubbington
	Used with the patient	Melnyk
	Provided information to patient	Hedegaard
	Provided counselling to patient	Innes Strobach
	Referred to another clinician	Melnyk
	Advised another clinician	McEntee Stubbington
	Circulated to colleagues	Hedegaard Stubbington
	Used for CPD	McEntee Stubbington

Based on:	Effect on the patient	Study (lead author)
	Used for teaching/training others	McEntee Stubbington
	Used to produce guidelines/protocols/PGDs etc.	McEntee Stubbington
Based on:	**Effect on the clinician**	**Study (lead author)**
Influence on decision-making	Used in decision-making	Bramley 2013 Frost Widnes Innes
	Used in decision-making for choice of treatment/to facilitate diagnosis	Stubbington McEntee
	Used in decision-making for funding/formulary	Bramley 2013
	Changed clinical practice	SchjØtt
	Managed risk of treatment already given Ability to explain risk/benefit	Innes
	Risk benefit assessment	Bertsche Frost Widnes
	Checked if treatment appropriate	McEntee
	Checked safety of treatment	Bramley 2013 Innes
	Decided best plan of action Confirmed change in therapy Confirmed safety of treatment	Bramley 2013
	Used with future patients	Hedegaard McEntee Innes
	Improved advice to patient/colleague	SchjØtt
	Emotional response e.g. reassured	Stubbington
Process measures	Time/costs saved by using the MI Service (PHS)	Marrone
	Costs saved by using the MI Service	Kinky
	Number of enquiries where changed patient management	Bramley 2009
	Opinion of MI staff about effect of advice - Resolved/prevented/corrected a MRP	Golightly

For each theme, I discuss the main findings of the studies reviewed, along with some of their shortcomings. Then in the Discussion section in this chapter, I explain why the positive findings of some studies need to be viewed cautiously.

Theme 1: Views of clinicians about the effect of Medicines Information advice on patients

I found seven studies which attempted to determine clinician opinion on the effect of MI advice on patient care (Cardoni and Thompson, 1978; Stubbington *et al.*, 1998; Melnyk, Shevchuk and Remillard, 2000; Bertsche, Hämmerlein and Schulz, 2007; Bramley *et al.*, 2009; Bramley *et al.*, 2013; Innes, Bramley and Wills, 2014). Although clinician opinion is a subjective surrogate measure of patient outcome, it is useful provided studies are designed appropriately

and limitations acknowledged. Asking the clinician is a reasonable choice as an outcome measure, as it is difficult to directly measure patient outcome unless objective clinical data are available e.g. reduction in blood pressure which occurs as a direct result of an MI recommendation.

In one structured (Cardoni and Thompson, 1978) and two semi-structured telephone interview studies (Melnyk, Shevchuk and Remillard, 2000; Bramley *et al.*, 2009), clinicians were asked to assess patient outcome against pre-defined criteria. In the Cardoni study, clinicians (58%, n=202) thought the information had affected patient outcomes and had a positive effect on patients and their care (78%, n=157), as they started or stopped a drug. In almost a third (29%) of cases clinicians selected the option '*other',* but data were lacking to determine what these responses meant. This early Cardoni study was retrospective and lacked clarity, making it difficult to interpret all the findings. In the Melnyk study (2000), 98 enquiries generated 230 recommendations by the MI service. Almost three quarters of respondents (74%, n=72) believed the advice had a beneficial impact on the patient, with an expert panel agreeing that almost half (47%, n=36) had resulted in a positive patient outcome; ten of which were based on objective measures, e.g. reduction in blood pressure.

In the small, non-peer reviewed study by Bramley *et al* (2009), 40 clinicians were asked three questions before receiving advice, one of which was centred on clinician expected patient outcome. The results are unclear as responses were not linked to the enquiry or clinician type. Thirty-two clinicians were available for follow-up, of which 59% (n=19) of patient outcomes were as expected, although three (9%) had improved more than expected and six (19%) had not improved.

Bramley and co-workers have subsequently published other works to try and measure the impact of MI advice (Bramley *et al.*, 2013; Innes, Bramley and Wills, 2014). Their study in 2013 was much larger (with 179 sets of complete data derived from 316 initial enquiries) than the 2009 paper (Bramley *et al.*, 2013). The majority of enquirers (81%, n=145) rated the impact on patient care or outcome as positive, 20% (n=35) said it improved patient outcome and over half (62%, n=110) replied that their patients' care was improved.

Only 15% (n=27) reported no impact. No negative outcomes or cases of worsened patient care were reported. An expert panel purposively reviewed 20 cases, and found that 19 (95%) of the cases had a positive impact on patient care. I will discuss the problems with the use of rating scales and expert panels in the section entitled 'Design and methods'. Although some clinicians (40%, n=71) agreed that MI advice resolved the therapeutic problem completely, almost a third (30%, n=53) said it was 'too early to know' and the rest (27%, n=48) selected 'no/did not know/not applicable'. This is not surprising as follow-up time was relatively short and therefore potentially too soon for outcomes to be known. Obtaining follow-up data about patients is problematic, particularly as their individual circumstances and/or time for patient response will vary according to the condition being treated.

Leading on from the 2013 study, Innes *et al* (2014) using the same methodology, completed a larger (n=1450) UK multi-centre study (n=62). Positive findings of the impact on patient care were reported, and mirrored the 2013 Bramley study. For example, the majority of respondents self-reported that the advice had a positive impact on their patients (92%, n=597), with 85% (n=547) considering this was positive regarding patient care or outcome. Furthermore, around half (53%, n=343) agreed MI advice reduced/decreased risk of an ADR and positively affected lowering risk/improving safety in patient safety/risk (58%, n=374). Almost half felt the patient was reassured (43%, n=273), while a third of respondents thought that patient understanding of medicines was improved (33%, n=213). Finally, just over a quarter of clinicians felt that patient ability to participate in choice about their medicines, regimen or health care was improved (28%, n=180). Even though this study was larger, and produced positive findings, because it used the same methodology as the 2013 study, it is open to the same criticisms.

Stubbington *et al* mailed a questionnaire to determine the action taken by clinicians in response to information provided on queries centred on adverse effects (Stubbington *et al.*, 1998). In this small, non-peer reviewed study, almost all respondents (95%, n=125) said they found the information helped, with the authors concluding that the MI Service had a favourable impact on

patient care in at least 40 patients (30%). A number of clinicians (n=21/117) thought MI advice helped them avoid a potential adverse event. Patient progress after receiving MI advice was known in almost two thirds of cases (n=79, 60%), this included 40 responses of patient improvement, but 19 were under review and in 17 there was no change. The Bertsche user satisfaction study (2007), also used survey methodology to sample primary care clinicians (n=1017), and included one question about patient outcome. Almost half of the clinicians (42%, n=190) agreed there was a potentially positive outcome, and thematic analysis of these responses revealed that MI advice allowed a switch to a more suitable medicine, correct dosing, enhanced adherence or avoidance of an interaction. Unfortunately, no quotes were provided to support these data. In summary, findings from studies asking clinician opinion of the effect of MI advice on patients were positive but had methodological limitations.

Theme 2: Actions of clinicians after receiving medicines information advice

Eleven studies attempted to determine how clinicians used the information provided (Stubbington *et al.*, 1998; Melnyk, Shevchuk and Remillard, 2000; Schjøtt, Pomp and Gedde-Dahl, 2002; Bertsche, Hämmerlein and Schulz, 2007; Bramley *et al.*, 2009; Frost Widnes and SchjØtt, 2009; Hedegaard and Damkier, 2009; McEntee *et al.*, 2010; Bramley *et al.*, 2013; Innes, Bramley and Wills, 2014; Strobach *et al.*, 2015). Most (n=8) were self-administered surveys, four of which were primarily user satisfaction surveys with supplementary question(s) about impact/patient outcomes (Schjøtt, Pomp and Gedde-Dahl, 2002; Bertsche, Hämmerlein and Schulz, 2007; Frost Widnes and SchjØtt, 2009; Hedegaard and Damkier, 2009). All studies report high levels of clinician action subsequent to receiving the information.

Stubbington *et al* (1998) found a high proportion (89%, n=117) of clinicians acted on the MI advice. These were categorised as: starting (n=21) or stopping treatments (n=20); to modify a patient's existing regimen (n=20); and to justify current therapy (n=16). In the Bertsche study (2007), the authors categorised the actions of clinicians as a switch to a more suitable

medicine or to correct or optimise the dose, although these were not qualified with supporting quotes (Bertsche, Hämmerlein and Schulz, 2007).

Melnyk *et al* (2000), also reported a high number of clinicians acting on MI advice (84% of 230 MI recommendations were accepted), with the greatest reported use (41%, n=78) being for provision of information/education, whilst other actions included referral to another clinician (11%, n=22), instigation of additional monitoring (10%, n=19) and recommending or adding a drug (13%, n=25). Similarly, in the Schjøtt (2002) study more than half (61%, n=71) of those doctors responding stated that the information provided had caused a change in clinical practice, with 68 going on to describe this change. These were categorised as changes in pharmacotherapy (n=32), improved advice to patients and colleagues (n=22), stopping a medicine (n=10), avoidance of an abortion (n=2) and reporting an adverse drug reaction (n=2). According to Hedegaard (2009) most doctors (93%, n=183) used MI advice, for patient information (79%, n=145), whilst about half used it to change treatment (45%, n=82), to disseminate to colleagues (51%) and for future use with patients (67%, n=123). Again, many respondents (94%, n=430) in the McEntee *et al* (2010) study acted on the MI advice provided, using this information to manage a current patient (81%, n=350) or to plan care of future patients (29%, n=125), for CPD purposes (24%, n=105) and for training/teaching purposes (16%, n=69). Certainly, responses in all these studies are positive, yet these results are rather superficial as no further details are provided, with no sense of context as responses were not related to the enquiry and advice provided.

Not surprisingly, in the Frost Widnes study (2009), looking at pregnancy queries, MI advice was used in some cases to avoid abortion (9%, n=11), although frequently it informed prescribers to either avoid/stop a medicine (29%, n=36), or start/continue a medicine (38%, n=47). While these results are easier to realise as they relate to a specific enquiry type, it would have been more convincing if there were some qualitative data describing the effects of the advice on clinicians and their patients.

In the 2009 Bramley paper, 30 (94%) clinicians had used the information provided, most frequently to start a medicine (25%, n=8), to change

administration/dosing (9%, n=3) or not to start a medicine (9%, n=3). Further studies involving Bramley used similar categorisation to illustrate actions taken. In their 2013 study, Bramley *et al* found that a quarter (n=44) of clinicians continued the medicine, while others started a medicine or changed the drug regimen (21%, n=37 for each), with a quarter taking more than one of the listed actions (24%, n=43). Half (54%, n=97) of the enquirers used advice to check medication safety, about a third (30%, n=54) to tell them the best plan of action and just under a quarter (22%, n=40) to confirm a change in therapy was needed. A criticism of this work, was that the survey questions were ambiguous and poorly worded. Similar findings were noted in the 2014 Innes study where about half (48%, n=311) of respondents used MI advice to check the safety or risks of treatment (Innes, Bramley and Wills, 2014). Another more recent study by Strobach (2015), detailed a total of 232 clinical actions (n=113). About half of these actions (49%, n=114) were considered to be due to MI advice, and included starting a medicine (n=34); stopping/not starting a medicine (n=21); modifying drug treatment (n=15); clinical monitoring (n=22); specific patient counselling (n=14) and modifying doses (n=6).

To summarise, all studies report high levels of clinician action subsequent to receipt of MI advice. Many used it to stop or start a medicine or to change treatment. However, these responses are superficial as researchers used pre-defined options to describe/categorise action without establishing/providing clinical context. I will discuss the problem of using pre-defined options in the section entitled 'Design and methods'.

Theme 3: Influence on their decision-making

Besides MI advice causing clinicians to take specific actions, some studies also reported how MI advice influenced their decision-making. In three studies this was framed as a more general question. In the Frost Widnes (2009) study (Frost Widnes and SchjØtt, 2009), when asked if advice was important in their therapeutic decision-making, the majority agreed (95%, n=111). In the Bramley *et al* (2013) study, just under half (44%, n=79) agreed that MI advice played a part in their decision-making process (Bramley *et al.*, 2013),

and this was also reflected in the Innes (2014) study (40%, n=262) (Innes, Bramley and Wills, 2014).

Clinicians could also be seen to use MI advice as a risk management tool; to reassure themselves (Stubbington *et al.*, 1998), to allow medication safety checks (Bramley *et al.*, 2013), help with their own risk/benefit assessment (Bertsche, Hämmerlein and Schulz, 2007; Frost Widnes and SchjØtt, 2009) or ability to explain risk/benefit to the patient (47%, n=306) (Innes, Bramley and Wills, 2014). Other clinicians (60%, n=71) agreed that advice caused a change in their practice (Schjøtt, Pomp and Gedde-Dahl, 2002), which included being able to give more informed advice to colleagues.

Findings from these studies suggest that MI advice does not always result in a direct action but can sometimes have other less obvious effects on the clinician. They use it in their decision-making, sometimes as a check, or to reassure, confirm or tell them or others what to do.

Theme 4: Views of patients about the effect of Medicines Information advice

Seeking the views of patients is an alternative to asking the clinician, particularly as the clinician (if not the prescriber, which was often the case) may not know the effect of provided information on patient outcome. Five studies attempted to determine the views of patients on the impact of MI advice (Melnyk, Shevchuk and Remillard, 2000; Joseph, Dean Franklin and James, 2004; Maywald *et al.*, 2004; Badiani *et al.*, 2017; Bramley, Innes and Dass, 2018). Joseph, Badiani and Bramley investigated the usefulness of advice provided to patients of a medicines helpline after hospital discharge (Joseph, Dean Franklin and James, 2004; Badiani *et al.*, 2017; Bramley, Innes and Dass, 2018). Joseph (2004) conducted a survey (n=87), which asked patients if they followed the advice given, about actions they took and how they felt. Almost all the patients who replied (97%, n=58) said they followed the recommendations provided, and overall, two thirds (66%, n=40) said a MRP was avoided; three quarters (75%, n=45) also reported being less anxious, yet a quarter (25%, n=15) felt they were more anxious; I propose this may be because they were made more aware of medicine issues having received MI advice. In particular, the impact of MI advice on patient wellbeing

(general, emotional, physical and social) was measured using a non-validated 5 point Likert scale (highly positive to highly negative). Although the well-being scores were high, general (83%); emotional (78%); physical (74%) and social (74%). In my opinion, questions about wellbeing may not be applicable to every MRQ asked, i.e. 'Is there a lactose-free tablet available?' Similarly, findings from the study by Badiani, involving 68 patients, revealed almost all (96%) followed the advice to some degree. Respondents believed advice received had avoided a MRP (27%) or the medicine problem had resolved (52%). Almost half (45%) of the respondents stated they felt reassured after gaining the advice. Lastly, the Bramley (2018) findings mirror those of Badiani, and of the 67 patient respondents, almost all (93%), followed the advice provided and felt reassured (81%) after checking about medicine safety and usage. A small number (19%) reported improved health or cure following advice received.

Maywald (2004) performed a much larger (n=1686) survey study, where patients were asked about how they used MI advice, actions they took and the impact this had (Maywald *et al.*, 2004). Of 920 respondents, over two thirds (68%) reported increased self-confidence in dealing with prescribed medicines, and others said uncertainties about medicines were reduced (81%). While, over a third (38%) used the knowledge provided to discuss the results of MI advice with their clinician, with some reporting a better state of health after implementing MI advice (20%), and others felt advice prevented a visit to their clinician (18%).

Finally, it must be noted that although the study by Melnyk *et al* (2000) reported data as 'consumers', it is not completely clear exactly who was a consumer. The authors reported on 68 'consumer' enquiries in which most (87%) recommendations were accepted and with the majority (92%) deemed beneficial to their care. This study also involved clinicians and is reported in Theme 2.

In summary, instead of asking the clinician, seeking patient opinion is a useful option to gain their perspective about the effects of MI advice. Patients said they felt more confident and reassured about their medicines and were able to discuss their treatment with their clinician.

Theme 5: Process measures

Lastly, three studies used other measures to assess impact of MI advice (Golightly *et al.*, 1988; Kinky *et al.*, 1999; Marrone and Heck, 2000). In an early study by Golightly (1988), MI pharmacists assigned pre-defined potential outcome codes to enquiries they answered from the public. The outcome codes included ADR or drug interaction prevented, corrected or explained, or therapeutic failure prevented. In the opinion of MI staff, advice given to the public prevented or corrected about three quarters (76%, n=4333) of MRP. However, the results should be viewed cautiously as they were purely based on the subjective, retrospective opinion of the MI pharmacists.

The two other studies considered potential cost savings by using an MI advice service (Marrone and Heck, 2000; Kinky *et al*, 1999). In the study by Marrone (2000), a simple cost analysis of medicines questions (n=308) was completed by multiplying the time MI staff spent answering the question by the average salary for types of clinicians asking the question e.g. clinical pharmacist, hospital specialist. This figure was called 'Practitioner Hours Saved' or 'PHS'. A total of 266 PHS was calculated which equated to a total annual cost saving of $43 950 at that time. This approach to assigning monetary value to the service is useful (when trying to prove 'worth'), however their findings need to be interpreted with caution as time spent on an enquiry will depend on the experience, and therefore pay, of the MI pharmacist, which this study did not capture.

In the Kinky (1999) study, investigators developed a cost avoidance model to determine outcome severity and potential cost savings of the enquiry answering service. An expert panel (made up of the MI director, an MI pharmacist, an adverse event co-ordinator and a pharmacoeconomics specialist) reviewed just over a quarter of all enquiries (28%, n=163) by deciding what would have happened if the MI Service had not answered the question by choosing an outcome severity score from a scale of 1 to 6, where one was categorised as no harm through to six, which was death of the patient secondary to a MRP. Although, as far as I can judge, the severity scoring scale used were not tested for reliability and validity. Using this model, potential cost savings were mostly due to prevention of increased monitoring

and/or additional treatment (46%, n=77). About half the enquiries had little or no measurable cost impact (51%, n=83), indicating that this may not be the most appropriate measure for many MI questions. Despite this, the authors projected potential annual cost savings of about $1.7 million. Other criticisms I have of this study, are that results were about potential rather than actual cost savings, and could only be calculated for a small proportion (14%, n=77) of all MI enquiries received.

In summary, other measures of the effects of MI advice have been used, including the opinion of MI pharmacists themselves. Studies of costs saved by using MI advice are useful to show an element of value but also had limitations. Having reviewed the studies under the five main themes they attempt to address, I will now discuss other strengths and limitations of the studies under sections, 'Design and methods' and 'Setting and sampling issues'. This will further highlight why there is a need for additional MI research, including my study.

Design and methods

Here, I discuss my concerns about use of prospective or retrospective surveys with pre-defined questions, with limited opportunity to provide additional information and the need for suitable response rates when quantifying data. I also discuss the reliability and validity of methods used, including the location of participants and the use of rating scales and expert panels. Generally, MI Service outcomes have mostly been collected from clinicians via surveys, with some attempting follow-up of patient-outcome by asking the clinician (Stubbington *et al.*, 1998; Melnyk, Shevchuk and Remillard, 2000; Bertsche, Hämmerlein and Schulz, 2007; Bramley *et al.*, 2009; Innes, Bramley and Wills, 2014), or the opinion of patients (Melnyk, Shevchuk and Remillard, 2000; Maywald *et al.*, 2004; Joseph, Dean Franklin and James, 2004; Badiani *et al.*, 2017; Bramley, Innes and Dass, 2018). Most studies (n=10) used self-administered surveys (Stubbington *et al.*, 1998; Schjøtt, Pomp and Gedde-Dahl, 2002; Joseph, Dean Franklin and James, 2004; Maywald *et al.*, 2004; Bertsche, Hämmerlein and Schulz, 2007; Frost Widnes and SchjØtt, 2009; Hedegaard and Damkier, 2009; McEntee *et al.*, 2010; Bramley *et al.*, 2013; Innes, Bramley and Wills, 2014) and although this method is a relatively easy

way to reach a study population, it is only useful if the survey is constructed properly, which was not always the case, and is discussed in the next paragraphs. Semi-structured telephone interviews were used in a couple of studies (Melnyk, Shevchuk and Remillard, 2000; Bramley *et al.*, 2009). This method should have enabled investigators to clarify respondent answers and probe further, but it is unclear what open questions were asked and where probing to elicit more information was employed.

Studies used clinician opinion, via completion of researcher pre-defined outcome categories, as well as through clinician expectation of anticipated patient response or inference that a reported action may have had a (positive) effect. Use of such measures limits the usefulness of study findings on MI advice influencing patient outcome because respondents were not given free choice in explaining outcome or were restricted to theorising outcome. All but one study (n=18) used pre-defined outcome categories based on the opinion of the investigators and/or MI staff, and in some cases were replicated from previous studies. Pre-defined categories assume the investigator knows exactly what categories are appropriate. Only the Hedegaard (2009) study completed interviews with doctors to help inform the content of the survey questions, one of which explored the impact of the advice provided. A further problem with pre-defined categories is that they cannot reveal the detail behind how clinicians use MI advice, about the specific action they take, or what happens to the patient afterwards. To highlight this point, in 9 of the 10 pre-defined impact statements in the Bramley (2013) study, at least a third and up to three quarters of clinicians selected 'not applicable', which calls in to question their appropriateness. Similarly, in the Melnyk (2000) study, pre-defined surrogate measures of outcome were used and unfortunately in a large number of enquiries (n value not specified) a tangible outcome was not found. Also in the Bramley studies, some questions from pre-defined categories were vague and overlapping, e.g. those about 'actions', meaning these would yield inadequate answers. More specifically, the question in Bramley 2013 about how they used MI advice, was poorly worded as it asked about both safety and risk in one question, which are two different things. Overall, I thought the survey in the Bramley (2013) study was long and

complex, with some double-barrelled questions, potential for survey fatigue, and consequently contributing to debatable findings.

More positively, in an attempt to obtain additional data to support the pre-defined items, open ended questions were included in a small number of the surveys. For example, Stubbington *et al* (1998), were able to theme responses about use of MI advice to provide greater context. This use of open ended questions was also noted in the Schjøtt (2002) study. However, the presentation of the findings from these two studies was hindered, as responses were quantified without any context or quotes.

It should be noted that self-administered surveys also need to have acceptable clinician response rates, with 60% or higher reported as adequate (Burns *et al.*, 2008); most studies reviewed achieved this, although some studies did report lower rates (Bertsche, Hämmerlein and Schulz, 2007; Innes, Bramley and Wills, 2014). Follow-up reminders are advocated to minimise non-responder bias, yet this was only documented in the studies by McEntee (2010), Bramley (2013) and Innes (2014). A further positive comment is that all surveys were anonymised, which is important as it may help improve response rates (Bryman, 2016).

My next point is about time to follow-up and study duration. It is difficult to know how long to wait after provision of MI advice before follow-up with a survey or interview. This is because the time scale for patient outcome varies from one case to another. Duration of studies ranged from 2 weeks for the Bramley 2009 study to the longest studies being 18 and 24 months respectively (Schjøtt, Pomp and Gedde-Dahl, 2002; Maywald *et al.*, 2004). However, follow-up time post provision of MI advice rather than the actual length of study is more important in terms of enabling the clinician to articulate the effect advice had on patient outcome. In studies where this was captured, lag time between generation of MI advice and follow-up tended to be short, typically two to four weeks (Melnyk, Shevchuk and Remillard, 2000; Bramley *et al.*, 2009; Bramley *et al.*, 2013; Strobach *et al.*, 2015). It is debatable if these time periods were appropriate given the high levels of reporting by clinicians on their inability to provide information on patient outcome.

Furthermore, for survey results to be representative an appropriate sample size needs to be achieved, (Bryman, 2016), which is often decided through use of sample size calculators (SurveyMonkey, 2019). Survey sample size was only considered in two studies, McEntee (2010) and Innes (2014). Both mentioned using a sample size calculation to ensure the study was sufficiently powered; all other survey-based studies appeared to be underpowered, with low participant numbers, and whilst small sample sizes using quantitative methods are generally acceptable for pilot or feasibility studies (Bryman, 2016), no study reviewed explicitly stated that they were pilot or feasibility works.

Despite the positive findings it has to be noted that the scales used in Bramley (2013) were biased toward positive reporting. For example, the scale used to ask about the patient's clinical condition was skewed to 'unwell' in four out of the five descriptors, and the scale used by the panel was skewed to positive impact on patient outcome in four out of the six descriptors, with only one neutral and one negative impact on patient outcome (See Appendix 2). Also, whilst it is helpful to see a patient wellbeing score in the Joseph study as a measure of the impact of MI advice, it is unfortunate that the investigators did not use a validated quality of life tool (AQoL, 2016). Unfortunately, some questions in this study were poorly worded and biased towards positive outcomes (Joseph, Dean Franklin and James, 2004). Additionally, there was no option to select 'other' or for patients to explain their actions in their own words, if the options provided were not suitable. If the investigators had used open-ended questions, responses could then have been analysed qualitatively, rather than just using a pre-determined list.

Ideally, items or scales included in surveys should be tested for reliability and validity to ensure they are measuring what is intended and in a consistent way over time (Bryman, 2016). Only eight studies appeared to validate their surveys in any way and where they did, gave brief and sometimes vague accounts. At best, some studies tested their surveys for face validity. Investigators in the McEntee (2010) study piloted their survey for format and ease of completion with 27 clinicians (53 were asked), while Bramley (2013) piloted their survey at one MI centre but did not state the number of

respondents in the pilot. Innes (2014) conducted their pilot in 14 MI centres, although they are vague about how this was done. While Stubbington (1998) piloted their survey with 8 potential respondents, and Melnyk (2000) undertook a one-week pilot to check documentation and identify any problems but they do not provide any more detail. Similarly, Maywald (2004), Bertsche (2007) and Hedegaard (2009) did pre-test their surveys but gave no further explanation. No studies tested their survey instruments for other types of validity or reliability.

Another point to mention about surveys, is that prospective surveys are usually preferred because they are developed with the research question in mind and so designed to minimise bias and confounding variables (Hands, Stephens and Brown, 2002; Spinewine and Dean, 2002; Bryman, 2016). Fortunately, most MI studies reviewed used a prospective approach (n=15) to evaluate the impact of MI advice.

It is encouraging to see studies published after the reviews (Hands et al., 2002; Spinewine & Dean, 2002) from 2002, especially publications in the last 5 to 10 years, having a greater focus on effect and outcome and attempting to adopt more robust and valid ways to asses these concepts. Recommendations such as the use of rating scales (Bramley *et al.*, 2013; Innes, Bramley and Wills, 2014; Bramley, Innes and Dass, 2018) and independent expert clinical panels, have been used in some studies (Kinky *et al.*, 1999; Melnyk, Shevchuk and Remillard, 2000; Joseph, Dean Franklin and James, 2004; Bramley *et al.*, 2013; Innes, Bramley and Wills, 2014; Bramley, Innes and Dass, 2018) and are to be welcomed. However, the pharmacy rating scales originally referred to in the Hands (2002) review, are positively biased, with some focussed on one element of clinical intervention e.g. adverse drug effects or harm, and appear not to have undergone any testing for reliability and validity. So, whilst these approaches have merit, those used suffered from potential bias, especially in over representing impact or outcome in a positive way. For example, Bramley (2013) used a rating scale based on scales previously used for measuring the impact of other clinical pharmacy interventions on patient care and outcomes, so was not specifically developed to evaluate the effects of MI advice. While it is good that Bramley (2013) then adapted the scale after

piloting and feedback to include multiple elements of both patient care/outcome and risk, it unclear how this was done. The Innes (2014) study subsequently adapted the scale used in the Bramley (2013) study (See Appendix 2), but this was not tested for validity. This used a five-point scale to assess multiple elements of impact, safety or risk and also patient care and outcomes, this use of multiple elements in one scale is inappropriate due to ambiguity. In both studies these rating scales were initially included in the surveys sent to enquirers and then amended by the expert panel to include a sixth point so that the panel could differentiate 'life-saving impact' from 'other highly positive impact'. Although Innes *et al* (2014) state their scale used by the expert panel was based on the scale used in Bramley (2013), and that it was 'developed and tested for reliability' in the previous study, again it is not clear how this was done, except that the scale in Bramley was piloted with two 'expert' panels. To illustrate the differences and for reference, I have included a table comparing the rating scales used in Bramley 2013 and Innes 2014 in Appendix 2. More recently Bramley *et al* (2018) reported validation of a modified version of their impact rating scale, however the level of detail reported on its validation within the paper makes it difficult to independently assess the authors' conclusions (Bramley, Innes and Dass, 2018).

Lastly, the use of expert panels can provide an objective view of patient outcome, with more recent MI studies utilising this methodology (Kinky *et al.*, 1999; Melnyk, Shevchuk and Remillard, 2000; Joseph, Dean Franklin and James, 2004; Bramley *et al.*, 2013; Innes, Bramley and Wills, 2014; Bramley, Innes and Dass, 2018). Melnyk (2000) used a panel to ascertain views on patient outcome, the views of the panel on positive outcomes were considerably lower compared to clinician opinion based on the survey results (47% n=36 vs. 73%, n=72). This difference in personal opinion of an individual and the consensus of an independent panel is good. In an attempt to obtain an unbiased, neutral view of the impact of MI advice, the more recent studies, Bramley (2013) and Innes (2014), also used a panel of clinicians to assess enquiries (Bramley *et al.*, 2013; Innes, Bramley and Wills, 2014), based on the recommendations of previous reviews (Hands, Stephens and Brown, 2002; Spinewine and Dean, 2002). However, in Bramley (2013), the expert panel only rated a small proportion of enquiries (20 out of 179),

and although the lead investigator also rated enquiries to see if they agreed with the panel rating, there were no checks for inter-rater consistency. While, in Innes (2014), the expert panel only assessed 24 of 40 randomly selected MI answers/completed surveys, expert panel ratings were compared to clinician ratings using Cohens Kappa, with inter-rater consistency scores of 0.62 and 0.4 for the patient care/outcome ratings and safety ratings, respectively (a score of 0.6-0.75 is regarded as good and 0.4-0.6 as fair) (Bryman, 2016). So consistency ratings were classed as fair, but with clinician/panel agreement for impact ratings better for patient care/outcome, than for risk/safety. Finally, the exclusion of MI pharmacists in some panels (Bramley *et al.*, 2013; Innes, Bramley and Wills, 2014) is unfortunate as they should be better informed to explain the rationale for MI advice given.

In summary, most published studies about the effect of MI advice have tended to use survey methods with findings almost exclusively being quantitative. All but one study used investigator-led, pre-defined survey items, most of which were not tested for reliability and validity and those that did report on these gave minimal or poor accounts of what took place. Some used impact rating scales biased towards positive outcomes, and included elements of both impact and outcome in the same scale. Response rates were low for some studies, and sample sizes were generally small. All these factors limit the usefulness of data reported. Finally, although using a panel is a reasonable means of getting the consensus of a group regarding the effects of MI advice, the constitution of the panel, rating methods and how consensus is reached, need to be better designed to assess the effect of MI advice.

Sampling and setting issues

In this section, I review the studies in terms of the sampling methods used to select clinicians and enquiries, as well as the setting i.e. the location of participating clinicians, patients and MI centres. With regard to sampling, most studies used purposive sampling, i.e. participants (clinicians/patients) and enquiry types were purposively selected according to the research question. Most studies included in this review tended to capture the breadth of MI advice for all types of (patient-specific) questions, provided to a range of clinicians. While this is good as it means a range of question types are captured, it also means that it is difficult to construct a survey that adequately captures data for all question and enquiry types. Three studies restricted the sample to a specific type of enquiry, Stubbington *et al* (1998) evaluated adverse effect enquiries, Frost-Widnes *et al* (2009) included only questions about pregnancy, and lastly, the Strobach *et al* (2015) study specifically selected drug-drug interactions (DDI). It is likely that targeting such specific question types would better enable effect or outcome to be evaluated as they are more likely to provide a very specific answer. Some investigators also excluded simple enquiries, instead targeting more complex questions that potentially require greater MI input (Schjøtt, Pomp and Gedde-Dahl, 2002; Strobach *et al.*, 2015), whilst others (Hedegaard and Damkier, 2009; Strobach *et al.*, 2015) aimed to survey clinicians with more complex MRQs by excluding those where advice was provided over the telephone on the premise that complex information could not be communicated by telephone. It is possible that focussing on the more complex MRQs may be helpful as in theory they may provide more data about the effect of MI advice, as these need more research and require a more in-depth answer.

Obviously, the setting for recruitment of study participants defines the types of clinicians included. The majority (n=15) of MI studies in this review included any clinician who used or had access to MI services. This probably stems from MI QA studies including all types of service users and the predominantly positivist approach used for conducting MI surveys to date. Although, attempting to minimise selection bias by including all service users provides a range of responses, these may not be relevant, especially if trying

to determine patient outcome. The problem being that in most studies a large proportion of enquiries were generated by pharmacists, ranging from 28% in the Stubbington (1998) study to 95% in the Bertsche (2007) study. However, pharmacists may not be in the best position to know the effects of MI advice, as they are generally acting as intermediaries between the patient and prescribing clinician and are not prescribing. This was recognised by Melnyk (2000) whose study methodology stated that if the enquirer was a pharmacist, then the doctor should be contacted to find out what happened. Therefore, a more logical way to evaluate the effect of MI advice is with clinicians who have prescribing power, as they are more likely to discuss and make treatment decisions about medicines with the patient. Only three studies specifically targeted prescribing clinicians; Frost-Widnes (2009), Hedegaard (2009) and Strobach (2015), although the study by Schjøtt (2002) included a high proportion of enquiries (about 70%, n=117) from doctors.
Similarly, studies (n=10) have been broad in their criteria regarding clinician location, studying the effect of MI advice on clinicians in both primary and secondary care (Cardoni and Thompson, 1978; Golightly *et al.*, 1988; Melnyk, Shevchuk and Remillard, 2000; Schjøtt, Pomp and Gedde-Dahl, 2002; Bramley *et al.*, 2009; Frost Widnes and SchjØtt, 2009; Hedegaard and Damkier, 2009; McEntee *et al.*, 2010; Bramley *et al.*, 2013; Innes, Bramley and Wills, 2014), as the scope of MI Services has expanded to include primary as well as secondary care. Four studies in this review focussed purely on clinicians in secondary care, with one a more recent publication (Stubbington *et al.*, 1998; Kinky *et al.*, 1999; Marrone and Heck, 2000; Strobach *et al.*, 2015), only one study looked at just primary care (Bertsche, Hämmerlein and Schulz, 2007). Five other studies included either, just patients (Joseph, Dean Franklin and James, 2004; Maywald *et al.*, 2004; Badiani *et al.*, 2017; Bramley, Innes and Dass, 2018), or patients (consumers) as well as clinicians (Melnyk, Shevchuk and Remillard, 2000).

Finally, despite studies using survey methods, only five studies used a multicentre design, to help aid recruitment, reduce bias and ensure a more representative sample (Bramley *et al.*, 2009; Frost Widnes and SchjØtt, 2009; Bramley *et al.*, 2013; Innes, Bramley and Wills, 2014; Bramley, Innes and Dass, 2018).

Discussion of my review of Medicines Information studies

Despite the limitations seen in current MI service research, it is recognised there is now a greater level of understanding on the effect MI services have on patient outcome compared to when the last reviews were conducted in 2002. An ability to show effect on patient outcome for MI services is important given they are under increased pressure (Gabay, 2017; NHS England, 2014).

Overall, findings from studies asking clinician opinion about the effect MI advice had on patients were positive, with reported high levels of clinician action subsequent to receipt of MI advice. MI advice did not always result in a direct action but sometimes had other less obvious effects on the clinician; using it in their decision-making, sometimes as a check, or to reassure, confirm or tell them or others what to do. In studies seeking patient opinion about the effect of MI advice, they reported feeling more confident and reassured about their medicines, and were able to discuss their treatment with their clinician. Few (and old) studies looked at impact from the perspective of costs saved. Given the continuing cost constraints on health care services, it is surprising that no recent studies have looked at costs and value for money.

However, these positive findings for MI studies need to be interpreted with caution due to methodological and study limitations. Firstly, these more recent studies report high levels of unknown patient outcome, which seem to originate from problems associated with follow up times or the enquirer not being in a position to report on patient outcome. Future studies should therefore ideally tailor follow-up time to each enquiry; this then should allow a higher proportion of clinicians to accurately report patient outcome. Frequently, the enquirer was not the prescriber, with a high proportion of pharmacists generating enquiries. More recent studies may, however, be less prone to non-prescriber outcome uncertainty as the role of the pharmacist has become more patient-facing and embedded within clinical teams, and thus involved in decision-making on patient care. Notwithstanding this, it is still the prescriber who is ultimately accountable for prescribing decisions and therefore best placed to describe patient outcome. It is also likely, at times, that the originator of the enquiry may no longer be caring for the patient (e.g. hospital patient discharged in to the community); in which case seeking the

views of patients is an alternative, but as yet relatively under utilised approach. Additionally, they can provide insight based on patient perception of outcome rather than those of the clinician. Triangulation studies using patient and clinician views on outcome is another, as yet untested way, of assessing outcome.

It is understandable that studies have taken a real-world pragmatic approach when trying to establish effect on patients, with a variety of measures used to report on patient outcome, given it is almost impossible to use empirical measures to quantify the effect of MI advice. Only Melnyk *et al*., reported some of their findings based on objective clinical data, e.g. reduction of blood pressure, as a result of MI advice to change an antihypertensive medicine (Melnyk, Shevchuk and Remillard, 2000). Studies used clinician opinion, via completion of researcher pre-defined outcome categories, as well as through clinician expectation of anticipated patient response or inference that a reported action may have had a (positive) effect. However, pre-defined use of such measures limits the usefulness of study findings on MI advice influencing patient outcome because respondents were not given free choice in explaining outcome or were restricted to theorising outcome.

As stated previously, rating scales and expert panels have been used in recent research in an attempt to provide more robust data on the effect of MI advice. However, the way in which these tools have been developed and used needs to be considered. Although work by Bramley and co-authors has used rating scales with descriptors of impact (Bramley *et al.*, 2013; Innes, Bramley and Wills, 2014; Bramley, Innes and Dass, 2018) these works appear to use non-validated scales that over represent the choices toward a positive response, thus introducing potential bias. I acknowledge and appreciate that while MI advice is unlikely to increase harm, this is not known for certain, and if reported, what level of harm this may have caused. Despite a recent 2018 study by Bramley *et al* reporting validation of a modified version of their impact rating scale, the level of detail reported on its validation within the paper makes it difficult to independently assess the authors' conclusions (Bramley, Innes and Dass, 2018).

This review highlights it is difficult to conduct research about the effects of MI advice that will capture all relevant patient and clinician outcomes, particularly when using a survey, as every clinical situation and MI question is different. Thus responses to questions about the desired, perceived or actual outcomes will vary as each individual has a different view. It is also difficult to fully determine actual patient outcome as a result of MI advice. For instance, the originator of the enquiry may only see the patient for that snapshot in time e.g. when they are seen by a clinician as an emergency, or if they cannot get an appointment with their usual doctor, so they are no longer directly involved in the patient's care to the point of knowing the outcome. Additionally, the patient may not consult the same clinician again, or may have a change in personal circumstances e.g. move geographical locations.

Additionally, for some their perception of the outcome of MI advice is often not easy to confirm as they may be asking the MI Service the question as an intermediary having been asked the question by another clinician e.g. a GP asks a community pharmacist or a hospital doctor, or a nurse asks a clinical pharmacist. In other words, the enquirer can be remote from the patient so they may not know the actual patient outcome never mind the effect of MI advice.

As highlighted by the Strobach (2015) study, only about half the clinical actions were as a result of MI advice as there were other influencing factors. This is because there are many other confounding factors that can potentially influence the final patient outcome, irrespective of MI advice given. Whilst MI advice can play a part in influencing the package of patient care, there are likely to be other factors that come into play, which means MI advice is less likely to be the major factor shaping patient outcome.

A limitation of my review of MI studies is that I did not include unpublished studies, although it is my view that findings worthy of publication would/should be disseminated as such. I also excluded non-English language studies, and I acknowledge this as a limitation, although historically most MI Services were in developed countries, so likely to be published in English language journals.

This section has highlighted the problems around terms used to evaluate the effects of MI advice, then reviewed the published MI literature relating to the effect of MI advice on clinicians and patients, and their methodological limitations. The next section discusses studies that have also attempted to measure the impact (effects) of Health LIS services, as they face similar challenges to MI services. To justify my chosen research methods, I have also described some of the methods used by Health LIS services to evaluate service effect, in the Methodology chapter.

An overview of studies conducted to evaluate the effects of Health Library Information Services

Health LIS also provide medicines information to clinicians. They are similar to MI Services, but staffed primarily by librarians and non-clinical staff. Like MI Services in the UK, they are NHS funded providers of clinical and medicines-specific information to clinicians (Perrier *et al.*, 2014). Although MI Services have links with Health LIS, they are tenuous and there is no formal national collaboration. As is the case for any service, it is essential to understand how the services they provide are used and valued by clinicians. The impact of various Health LIS has been studied, although I have not done a comprehensive review of these studies as it is beyond the scope of my thesis. However, several reviews have found, like my MI review, limited evidence of impact because of poor study quality (Weightman *et al.*, 2009; Brettle *et al.*, 2011; Marshall, J. G. *et al.*, 2013; Perrier *et al.*, 2014; Brettle, Maden and Payne, 2016). In the next section, I discuss some of the methodological issues and findings of these reviews and a recent study which are relevant to my research.

A systematic review by Brettle *et al* (2011) considered the methods used in published studies to evaluate the impact of Health LIS from 2001 to 2009. Of the 18 studies included, most (n=14) were undertaken in the UK and used surveys for data collection with some open ended questions and follow-up interviews. The Brettle (2011) review highlights, as I have for MI studies, the difficulties of using quantitative or experimental research designs to evaluate the effect of providing an answer to an enquiry. Further, the authors also agree with my point that an answer is unlikely to directly influence patient

care as other factors will also play a part, so need to be taken into account when interpreting the results of Health LIS studies.

Comparable to review findings for MI studies, systematic reviews of Health LIS impact studies (Brettle *et al.*, 2011; Perrier *et al.*, 2014) also found that a wide range of outcome measures were used. The difficulty in measuring outcomes for these services is similar to MI Services as they may not be 'immediate, tangible or direct', which means that demonstrating effectiveness or impact is 'likely to be difficult or complex' (Brettle *et al.*, 2011). In fact, these reviews acknowledge that it is difficult or perhaps impossible to measure a direct impact of Health LIS on patient care.

A further larger UK study of Health LIS impact by Brettle *et al* (2016) on patients and clinicians used self-administered surveys and semi-structured interviews to get a more in-depth understanding of service impact (Brettle, Maden and Payne, 2016). Findings are reported quantitatively based on the survey (response rate 43%, n=340), with quotes used from interviews to illustrate a point. Clinicians were asked how they used the information provided and the contribution and impact it had on decision-making and evidence-based practice. This was done by providing a pre-defined list, with the option to expand their answer and they were also asked about contribution to patient care and health care outcomes; the choices were about quality of care; service development; CPD; efficiency; and financial or risk management. As is the case for some MI studies I reviewed, this paper also suffered from the pitfalls of overcomplicated and ambiguous survey design. Twenty-four interviews were also completed and utilised a standard template to summarise interview data for each case, although the interview responses and qualitative analysis were not reported, apart from a mention that themes could not be identified.

In summary, the impact (effect) of various Health LIS has been studied and highlights limited evidence of impact because of poor study quality (Weightman *et al.*, 2009; Brettle *et al.*, 2011; Marshall, J. G. *et al.*, 2013; Perrier *et al.*, 2014; Brettle, Maden and Payne, 2016). As a result of these clinical librarians have now developed tools to help measure value and impact (Knowledge for Healthcare Impact and Value Task and Finish Group, 2016).

Conclusions and summary of this chapter

In order to ensure MI Services are fit for purpose, it is important that we try to understand how they are used. In the current economic and evidence-based climate showing the value of an intervention or service in the NHS is a priority, thus the focus of MI research has now shifted from QA studies, to studies specifically designed to evaluate outcomes. Most of these studies have attempted to find out the effect of MI advice on patient outcomes, but as this review and others highlight this is unrealistic, as it is virtually impossible to directly link patient outcomes to the MI intervention. Furthermore, the majority of studies have provided only relatively superficial findings about use of MI advice by clinicians and possible effects on patient care. Therefore, there is plenty of scope for further MI research around the effects of MI advice.

Previous suggestions for future studies, from other authors, have included recommendations for independent evaluation of the outcome, such as using patient notes or discussion with the enquirer, prescriber or the patient (Hands, Stephens and Brown, 2002), however this is unlikely to be practical due to time and cost restrictions. The Hands review (2002) also suggested other options for future MI impact studies, including the need for more detailed economic analyses, other than costs saved (Kinky *et al.*, 1999), such as cost benefit analysis using economic modelling. However, this type of study is yet to be undertaken in the MI field, probably because it requires specialist knowledge of health economics, and is likely to be costly and time consuming. Further suggestions are made in the Hands review to try to 'quantify' the impact of MI advice, such as seeking the 'enquirer's impression of the service', or asking the views of managers and other users of MI answers. It is noticeable that the authors focus on ways to quantify impact and seem to ignore purely qualitative approaches, possibly because qualitative research was not as widely recognised in 2002, when these reviews were conducted.

A limitation of many MI studies, is that a high proportion of respondents were pharmacists. Previously, pharmacists have not been prescribers, so whilst they often asked the MI Service the question, they were not necessarily in a position to make prescribing decisions or to know the effect of MI advice on

clinicians and patients. Future evaluation and/or research could include pharmacists who are prescribers, but they need to be routinely recorded as prescribers so their use of the MI Service can be evaluated.

Findings about how MI advice has been used by clinicians and the effect on patient care are scarce, which means there is a need for further research using appropriate methodologies. We need to better understand how and why clinicians use MI advice to help us better evaluate the effect of MI advice in the future to help support service development. As studies have mostly used survey methodology with pre-defined items, research about how MI advice influences clinicians in their decision-making and patient care are lacking. Future research needs to be well-designed with questions, methods and content closely linked to the original research aims and objectives, perhaps linked to specific enquiry types and clinicians.

Suitable patient and clinician outcome measures could be better defined through more in-depth research, for example interviews to understand how MI advice is being used. The content of self-administered surveys could then be appropriately developed to incorporate the findings, piloted and validated. Lastly, use of expert panels, rating scales and outcomes need to be further developed and tested for reliability and validity from those scales that already exist. Methods to gain consensus regarding development of content, such as Delphi technique (Bryman, 2016) could be used to inform survey content.

Health LIS have experienced similar problems to MI Services when trying to evaluate impact and value and suggest conducting face-to-face or telephone interviews to gain a deeper understanding of their service or to supplement data obtained via surveys with interviews as they will provide the explanation of "how" and "why".

In this background chapter, I have put into context the difficulties faced by primary care clinicians when they need to address a MRP, particularly for increasingly complex patients. They have access to a wealth of digital information but limited time and skills to access it, meaning they seek help from specialist services. Research from both the MI and Health LIS field has attempted to evaluate their effect (impact) on clinicians and patients, alike but

with limited success. MI advice does contribute to patient outcome although determining to what extent is difficult due to limitations in study design and data capture. From my review of MI studies, very little is known about how clinicians use MI advice in their decision-making and patient care. There are no studies which attempt to gain a deeper insight into the effecst of MI advice. These studies could be used to help inform further research into the effect of MI service advice and the purpose of my study is to address this gap.
The aim of my study was to better understand how primary care clinicians use MI advice. More specifically the objectives were to explore how MI advice influences prescribing clinicians in their decision-making, and how they think advice subsequently affects patient care. In the next chapter, I explain my chosen methodological approach and discuss the methods I used.

Chapter 3 Methodology

Introduction to this chapter

This chapter explains the methodology I used to explore the aim of this research, which was to better understand how primary care clinicians use MI advice. This chapter is subdivided into sections where I provide my rationale and explain the research process I undertook based on my theoretical perspective and epistemology, including my choice of methodology and methods.

The study objectives, which were to explore how MI advice influences prescribing clinicians in their decision-making, and how they think MI advice subsequently affects patient care. The research design is influenced deductively in the first instance based on the key concepts explored in the literature review. The themes then evolved during the process of analysis on the basis of the evidence gathered. Taking an idealist approach and using a generic qualitative, interpretive exploratory methodology, I chose to do qualitative interviews with prescribing clinicians. All interviews used the Critical Incident Technique (CIT) and explicitation, based on a specific MRQ they asked the MI Service. Firstly, telephone interviews were done nationally, then in-depth face-to-face interviews were done in one region in England.

Finally, in this chapter I discuss my analytical process, my ethical considerations and how I ensured the credibility (validity) and dependability (reliability) of my research.

My choice of research paradigm

I will now discuss my thinking and rationale for choices behind each element of my chosen research paradigm (Crotty, 1998). Prior to starting this research I had a more 'realist' ontological approach, in that my belief was that reality exists independently, is objective and that quantitative data can be collected to represent it (Giacomini, 2010), and is certainly the premise for the design of randomised controlled trials and the evidence-based medicine paradigm, which has a large following in the field in which I work. This appears to be the premise upon which previous MI studies have been framed.

However, I realised that the research position and methods used thus far to study the effect of MI advice on prescribers and patient care were not suited to understanding how MI advice is used. Also, I was more familiar with applied rather than pure research, since applied research is used to address a practical problem and resonates with my real-world, logical approach and pharmacy training.

As a pharmacist I am from a more traditionally science-based, positivist epistemological background, however the nature of this research required exploration of methodological areas that were unfamiliar to me. As my aim and objectives were to explore how clinicians use MI advice in their decision-making around prescribing and patient care, I was seeking to interpret the social world (Higgs, 2001) and attempting to do research that did not '*focus primarily upon the identification and explanation of facts, but upon the illumination of peoples' interpretations of those facts'* (Porter, 2000, p141). In contrast to my previous positivist perspective, this encompasses an interpretive, constructivist paradigm, which uses qualitative research methods (Bryman, 2016). I realised I needed to not only be aware of, but to explain and justify my ontological and epistemological perspective regarding how I see the world, my research approach and how I collected and interpreted the data.

From an ontological perspective my views sit on the spectrum between 'realist' and 'relativist' (Giacomini, 2010). As others explain, as humans we are situated in a reality which is constructed by our subjective experience, this means we are incapable of total objectivity (Crotty, 1998; Ratner, 2002). While, I believe that subjective meanings are crucial to gain an understanding of how things work in everyday life, I adopted an 'idealist' approach, which I felt was suited to my research design as this approach values subjectivity, particularly that of the researcher and participants, but to a lesser extent than a relativist one (Green and Britten, 1998; Given, 2008). Since all clinicians have their own way of finding, interpreting and using information about medicines for and with their patients, I wanted to understand their perspective.

I was aware that my background as an MI pharmacist and partial-insider researcher, would influence all aspects of the research process and I discuss

this in more detail later in this chapter. I also realised that as an experienced MI pharmacist providing advice to clinicians and their patients, there are many perspectives, experiences and influencing factors to consider when making treatment decisions and using information and knowledge to care for patients. This research attempts to understand how clinicians use MI advice, and therefore my epistemological position is that the social world is complex, meaning that to understand this knowledge I needed to be aware that there are multiple versions of reality and truth.

Justifying my choice of methodology

I took a pragmatic stance as my view was about getting the research done (Guest, MacQueen and Namey, 2012) and adopted a generic qualitative, interpretive exploratory approach (Clifford, 1997; Caelli, Ray and Mill, 2003; Kahlke, 2014; Auta, Strickland-Hodge and Maz, 2017). As my research aim was to understand how clinicians use MI Service advice in the clinical setting. my research was ethnographic in nature because I wanted to understand how clinicians use MI advice in practice and used interviews to collect data (Creswell, 2013).

In addition, my research was aligned towards a phenomenological approach as I wanted to understand the subjective views of clinicians, including their perception and feelings about how they used MI advice (Clifford, 1997; Guest, MacQueen and Namey, 2012; Neubauer, Witkop and Varpio, 2019) While this approach captures the 'lived experience' of a particular event (Gray, 2014), I felt it was not appropriate as the researcher needs to 'bracket' their own understandings and allow the phenomena to 'speak for themselves' (Gray, 2014). As an MI pharmacist, I was a partial-insider researcher (Costley, Elliott & Gibbs, 2010; Greene, 2014), doing research about how clinicians use MI advice as I was using my MI background to question clinicians and interpret their responses.

I also needed to consider my position as an insider researcher and how this could affect data gathered and thus the analysis (Greene, 2014). Although this was insider research, the degree of such can be considered on a continuum, so although I was an MI pharmacist at the time of data collection,

I was not a prescribing clinician. Nor was I employed as a practising MI pharmacist during the final analysis and discussion of these findings, as such my role was one of a partial-insider (Greene, 2014).

Finally, my research uses elements of a modified Grounded Theory (GT) approach, particularly in the stage of analysing the evidence. I used a constant comparative analysis which was iterative, inductive, complex and time-consuming, and during the evidence collection I tried to do some ongoing analysis to inform refinement of my interview questions (Glasser BG and Strauss AL., 1967; Clifford, 1997; Charmaz, 2006; Corbin and Strauss, 2008; Guest, MacQueen and Namey, 2012). When I set out to explore use of MI advice, my research question was developed after reviewing the literature, yet my research design was iterative in nature as I gathered evidence which I analysed inductively, linking my findings back to the existing literature (Charmaz, 2006).

A generic qualitative, interpretive exploratory approach (Caelli, Ray and Mill, 2003; Kahlke, 2014; Auta, Strickland-Hodge and Maz, 2017) was appropriate as my research question was borne out of my practice experience as an MI pharmacist and I wanted to understand how clinicians used MI advice in their decision-making and patient care (Kahlke, 2014). As such the research framework links with clinician use of MI Services, decision-making and patient care. I explain the boundaries of this research and the ethical implications of not using a specific methodology in the section 'my reflexive approach to this research' (Kahlke, 2014). On the basis of this methodological approach, I justify and discuss the methods I chose to carry out this research.

Justifying my choice of method

I decided to select prescribing clinicians in primary care, rather than all clinicians as participants because government health policy has increasingly required patients to be managed in primary care (NHS England, Royal College of General Practitioners, and Health Education England, 2016). With this expansion of clinical service provision in the primary care environment further emphasising the need to explore how these clinicians use MI advice in their decision-making and patient care. Furthermore, these clinicians are under

increasing prescribing pressures, as their roles are changing to include management of more complex patients that historically would have been managed in secondary care. For these reasons I chose primary care clinicians.

I targeted prescribing clinicians who could be easily recruited via the MI Service enquiry database (MiDatabank®) (CoACS Ltd, 2014), at the time this study took place, which meant selecting GPs and dentists as MiDatabank® did not capture those other primary care professions allied to medicine with prescribing rights (e.g. nurses and pharmacists). I chose purposive sampling to enable clinician recruitment at the time they contacted the MI Service (Gray, 2014). This sampling was based on the principles of maximum variation sampling (Bryman, 2016), as all GPs and dentists in England and Wales who contacted participating regional MI centres with a patient-specific MI enquiry were included.

Initially, all regional MI centres in England and Wales were invited to participate and recruit as many potential participants as possible. A total of eight (from a maximum of 12) regional MI centres in England and Wales agreed to participate. MI staff were instructed to ask all GPs and dentists who contacted their centre with a patient-specific enquiry if they were willing to be involved in the study and interviewed by telephone. Patient specific MRQs received and answered by all trained staff working for the MI Service, usually pharmacists and technicians, were eligible for inclusion.

In addition, all types of MRQ were included, by this I mean those questions about administration and dose; adverse effects; availability and supply; pregnancy and breast feeding; choice of therapy; complementary medicines; identification; interaction; and pharmaceutical. This maximum variation sampling also meant a diverse range of MRQs were available to help me identify patterns in the data (Gray, 2014). This sampling method ensured all patient specific MRQs were eligible for inclusion. Multiple MRQs from a single clinician were also included, as my study was about understanding how the MI advice provided in response to their question, influenced their decision-making.

As per usual practice, all MRQs and associated relevant details, including the work done by MI staff to answer the clinicians' questions and the advice provided, were saved on MiDatabank®. These MRQs were also coded with a complexity level by the staff member answering the question, based on the question asked, clinical situation, the search, critical thinking required and answer. All complexity levels were included. Please refer to Appendix 3 for a full description of UKMI Service enquiry levels 1 to 3.

For data collection, I thought that interviews would be a possible qualitative method to use, as this study was about clarifying and understanding clinician use of MI advice and getting their perspective, and interviews are useful for understanding the meaning of the world in which people live (Kvale, 1996). I anticipated that numbers of clinicians available for interview would be low compared to those who initially expressed an interest to participate. Therefore, for a range of clinicians and their perspectives, prescribers throughout England who contacted MI Services with a MRQ were recruited for interviews. As clinicians were geographically spread, interviews by telephone were approved by the University of Wolverhampton Ethics Committee (Appendix 4).

These semi-structured interviews were conducted by myself, as the research lead, and three final year pharmacy students from the University of Wolverhampton, selected by senior staff as academically able students (grades over 65% and on track to get a 2-1 or above).

There has been much debate around qualitative interviews, particularly the pros and cons of telephone versus face-to-face (Bryman, 2016; Oltmann, 2016). However, qualitative interviews via telephone have become more common, and as Oltmann explains some authors have found they produce comparable results to face-to-face interviewing (Oltmann, 2016). Yet rather than trying to justify that telephone interviews are comparable to face-to-face, I agree with others in that they have their "*own unique merits*" (Oltmann, 2016; Vogl, 2013). That is, I considered both interviewer and respondent contexts for telephone interviews (Oltmann, 2016) and I felt they were appropriate as I was able to audio record both parties, they would be less

intrusive, more convenient for clinicians, and easier for all to schedule/ reschedule if required.

In this study, the interviews over the telephone provided a good insight into how clinicians said they used MI advice, however I felt that there was potential to expand on the telephone interview findings and try to understand in more detail, how they used MI advice in their decision-making and patient care. Thus, I felt I needed to conduct more interviews to expand on my findings from the national interviews.

Also, as the interviews by telephone included all MRQ complexity levels, the simpler (Level 1) MRQs were not addressing the research question in enough depth. As such, the more in-depth, face-to-face interviews excluded Level 1 questions and recruited clinicians who asked the more complex MRQs. The rationale being that more complex questions potentially require more complex decision-making and patient care.

I decided to do these interviews as face-to-face to allow for more in-depth probing, by myself as an MI practitioner. Face-to-face interviews would also allow me to pick up on any non-verbal behaviour. For these face-to-face interviews, I used the North West regional MI centre in Liverpool to recruit clinicians, as it was the MI centre where I was based and more practical for me to travel to do interviews within this region.

In this study all interviews (telephone and face-to-face) used the Critical Incident Technique (CIT) and explicitation, as techniques to help the interviewee recall the MRQ and what happened when they contacted the MIS (Flanaghan, 1954, Urquhart *et al*, 2003). Interviewees were asked to put themselves 'back in the situation' and tell the interviewer what they did regarding the MRQ they asked (Flanaghan, 1954). They were reminded of their MRQ when they called the MIS to try to get interviewees in a state of 'evocation' and help them recollect what happened at the time rather than giving an account of what they thought the interviewer wanted to hear (Urquhart *et al*, 2003). To do this I used 'what' and 'how' questions which asked about 'the last time they sought MI advice'. Clinicians were asked to remember what happened when they sought and used MI advice for a patient-

specific MRQ by referring back to the question they asked and advice that was provided to prompt their recall. The premise behind incorporating these approaches in my interviews was to try to get accounts of what happened when they sought MI advice and how they used it.

This methodology is now being advocated by the Health LIS for evaluating clinical librarian services as they explain how these techniques require '*users to provide details of specific use and then answer questions relating to this particular instance*' (Library and Knowledge Services, 2018 – see Critical Incident Technique). These techniques have also been used in other studies of clinician prescribing, information seeking and decision-making. (Brettle *et al.*, 2011; Library and Knowledge Services, 2018).

The CIT has been used in interviews to try and understand tasks e.g. in pedagogic research to understand thought processes that were considered impenetrable and to provide insight into learning processes, to understand information seeking and human-computer interaction. The review by Brettle found that using '*CIT can highlight positive impacts of the contribution of clinical librarian services*' (Brettle, 2011, p20). It is a technique which helps investigation of introspective processes and encourages the interviewer to be impartial and not to judge the interviewee and so I felt they would be useful in my interviews with clinicians.

As part of the process of justifying my chosen method, I reviewed the methods used in studies that also explored clinician prescribing behaviour, information seeking and decision-making. I found that studies with GPs in the 1990s used semi-structured interviews to explore prescribing behaviour (Bradley, 1992; Armstrong, Reyburn and Jones, 1996). The Bradley study also used CIT, which has subsequently been used to assess performance in professional practice, the prescribing decisions of doctors and in information behaviour studies in the health sector (Bradley, 1992; Sharoff, 2008). More recent studies of GP prescribing have used semi-structured interviews (Grant, Sullivan and Dowell, 2013) and interpretive, thematic analysis (Grant, Sullivan and Dowell, 2013; Sinnige *et al.*, 2016).

When making the decision to use telephone and then face-to-face interviews, I considered using focus groups and clinical vignettes as they are an effective means of evaluating treatment decisions made by GPs (Peabody *et al.*, 2004; Moen *et al.*, 2010; Smith, O'Kelly and O'Dowd, 2010; Luijks, H. *et al.*, 2015). While focus groups are useful as a means of exploring issues and collecting qualitative data, they are essentially group interviews, so were not suitable because I wanted to know about use of MI advice by a single clinician for a patient specific MRQ, which did not require group discussion. A more recent study used focus groups with clinical vignettes to try to understand how doctors make prescribing decisions (Sinnige *et al.*, 2016) and I did contemplate constructing clinical vignettes based on a range of MRQs but felt it would probably be difficult to get clinicians to spend their valuable time discussing hypothetical scenarios not directly relevant to their individual practise (Bryman, 2016).

Finally, field study observation of clinicians using MI advice was a possible option, but would have necessitated being in clinical practices during consultations, or videoing consultations and so I decided this was not appropriate for my study as MRQs requiring MI advice were not likely to occur in every clinician-patient consultation and observation would not capture the non-verbal decision-making process. Also my presence during in the consultation would have undoubtedly influenced clinicians to behave differently (McCambridge, Witton and Elbourne, 2014) and the effect of MI advice would not be seen immediately during the consultation. Potentially, this method would be useful for another study if we wanted to understand how clinicians handle MRQs during consultations, rather than how they use MI advice.

Interview questions were devised empirically to try to understand what clinicians did (if anything), prior to contacting the MI Service, what they did after getting MI advice and what happened to the patient. I also wanted to understand how they used MI advice in their decision-making process and its influence on their decision-making, how they used it in patient care and whether the problem was resolved. For the interviews by telephone, an introductory script and semi-structured telephone interview guide were used, which consisted of mostly open-ended questions. The interview schedule

permitted additional questioning and/or probing relevant to the research aim and in response to the answers given by the interviewees.

Along with some basic participant demographics obtained during recruitment or at interview, clinicians were asked about their use of the MI Service by focusing on the MRQ asked. The questions used, with suggested prompts are listed in Table 3.1 (see Appendix 5 for a full copy of the interview guide and introductory script). N.B. *The highlighted section in the interview guide is to give an example of how the questions compared with those used for the interview conducted face-to-face.*

These semi-structured interviews were conducted over the telephone by myself, as the research lead, and three final year pharmacy students. The students were used to improve research capacity and enable more interviews to be conducted and were included in the ethics approval. The final year pharmacy students also needed to carry out their own final year research projects, which were also submitted separately for university ethics approval. With training, they did some of the telephone interviews with my help and used the interviews they completed in their final year project.

Table 3.1 Telephone interview questions and suggested prompts

- Before contacting the MI Service did you consult anyone else/any information sources?
- If Yes, who did you ask?

Researcher Note: Ask about company/other health care professionals. e.g. colleague, GP, community pharmacist, PCT pharmacist)

- If Yes, what information sources did you use?

Researcher Note: Ask about books/websites etc.

- What prompted you to call the Medicines Information service?

Researcher Note e.g. Used MI before and found it helpful/Found conflicting information and not sure what to do/ No time to look into, so thought I'd call you/computer warning/Someone else asked me a qu/No in BNF/Letter from Specialist

- Did the answer provide you with enough information to make a decision about how to manage your patient?
  Completely/Partly/Not at all
- If Completely, why?
- If Partly/Not at all, why not?
- On a scale of 1 to 5, where 1 is "not very helpful" and 5 is "very helpful." Overall, how helpful was the information in deciding how to manage the patient?

- What action did you take as a result of the advice provided by the Medicines Information service?

Researcher Note e.g. Choice of therapy: Started drug X/referred to specialist.
ADRs: stopped drug X/started drug X
Dose & Administration: Changed dose A of drug X to Dose B of drug X. Changed drug X from route A to route B
Interactions: stopped drug X and started drug Y. Pregnancy: stopped drug X/started drug Y
Breast feeding: stopped drug X/started drug Y

- What influence did the advice provided by the Medicines Information service have on your decision?
- What other issues did the Medicines Information service make you aware of (if any)?
- What other factors did you consider to help you make your decision?
  Researcher Note e.g. drugs tried already/co-morbids/patient circumstances/patient discussion/colleague advice.

- What happened to the patient as a result of the advice provided by the Medicines Information service?

Researcher Note e.g. Choice of therapy: patient took drug & condition improved. ADRs: resolved/still present/too soon to say
Dose & Administration: Stopped/started drug X & condition improved. Interactions: Switched to drug X & condition improved
Pregnancy: pregnancy ongoing & condition improved. Stopped drug X/started drug Y & pregnancy going well
Breast feeding: still able to breast feed and condition improved

- Overall, what effect did the MI advice have on the care of your patient?

- Is the problem still ongoing?
  a. If Yes, what have you done since to manage the problem?
  b. Did you get any subsequent information/advice?
  c. Where did you get any subsequent information/advice?

Researcher Note: e.g. company/books/website/colleague/GP/hospital consultant/community pharmacist/PCT pharmacist/website

- What information/advice did you get?
- Did you record the Medicines Information advice in the patient notes?

Eight regional MI centres initially agreed to participate in national recruitment of clinicians for interviews, one centre did not recruit any clinicians. Of those clinicians, that were eligible to participate (n=181), over three quarters (78%, n=142) provisionally agreed to be interviewed. Forty-three telephone interviews with clinicians were completed by myself (n=17) or one of the three final year pharmacy students (n=26), which was just under a third (30%) of clinicians who originally agreed to be contacted. Although, three interviews were excluded (two were inaudible and one because it transpired they were not a prescribing clinician).

As discussed earlier in this chapter, although findings from the telephone interviews provided valuable insight into how clinicians used MI advice, I felt that there was the potential to further understand, in more detail, how they used MI advice in their decision-making and patient care.

For the more in-depth face-to-face interviews, a further semi-structured interview guide was developed based on my experience of conducting the interviews by telephone, to try to elicit additional detail about how they used MI advice, by focussing on the more complex (Level 2 and 3) MRQs and to hopefully expand on the findings and themes obtained thus far. A protocol for further interviews to be conducted face-to-face was approved by the University of Wolverhampton Ethics Committee (April 2014) (Appendix 6). This enabled additional questions to be asked, according to participant responses and was flexible, so questions could be omitted if the clinician had already provided responses which a question addressed.

The questions used in the interview guide are listed below in Table 3.2. N.B. *The highlighted section in the interview guide is to give an example of how the questions compared with those used in the telephone interviews* (see Appendix 7 for a full copy of the interview guide). Prior to the tenth interview, I amended the interview guide to prompt more specifically about why they called MI for advice i.e. "at what point were you prompted to call?" The rationale for this change was because I did not feel clinicians were describing their actions fully.

Table 3.2 Face-to-face interview questions and suggested prompts

PART I: Recent medicines case and MI advice

- Tell me what happened in this case about [*insert title of MRQ here……]*

Additional questions:

- What prompted you to call?
- How did you use our advice?
- How did this advice affect your decision-making?

Prompts:

- *Explain how you decided what to do next/about [……]?*
- *What (else) did you do after getting MI advice?*

e. g. patient discussion/colleague discussion/record in patient notes

- How did you feel after getting our advice?
- What happened with the patient?

Prompts:

- *Describe how you used our advice with this patient?*

N.B. Explore effect of advice on relationship with patient/use in shared decision-making.

- If you hadn't called MI for advice, what would you have done?

i.e. how do you think you would have sorted the problem out?

PART II: Questions around key themes from phone interviews

Risk

- Other prescribers have described how they used UKMI advice to minimise risks to themselves and/or their patients. What do you think about this?

Use of advice for reassurance/to confirm thinking

- Other prescribers have described how MI advice reassures them and/or helps confirm what they were thinking when they were unsure what to do. What are your thoughts on this?

Practising evidence-based medicine

- What does EBM mean to you? (*link with patient care*)
- Tell me about sources of medicines advice you use
- Tell me how you ensure you practice EBM
- How does MI advice fit with this?

Practical/timely advice

- Other prescribers have described the practical nature of MI advice. What do you think about this?
- Other prescribers have described the timely nature of MI advice. What do you think about this?

Clinical decision-making

- Tell me how you generally make clinical decisions about medicines?

Prompts:

- *Please explain your thought processes*
- *What else do you do?*
- *What factors do you consider? (e.g. previous cases seen; experience; weighting; time)*

Repeat users only: Describe how MI advice fits into your clinical decision-making

Prompts:

- *What else do you do? e. g. discussion with GP colleagues/hospital specialist*
- *What happened in another case that you can remember?*

Patient care: (*Repeat users only*)

- Explain how MI advice influences your patient care?
- Tell me a bit more about how you use MI advice with your patients
- In your opinion, how does MI advice impact on patient outcomes?

Prompts

- *What happened in another case you can remember?*
- *Give some examples of patient outcomes*
- *What do you discuss with them? e g. What do you tell them about our service?*

MI Service

- *Repeat users*: When do you tend to contact us for advice?
- *First time users*: What triggered you to contact us? (*if not fully explained in Part I*) Why have you not used us before? What would happen if you couldn't get MI advice? Please tell me anything else you would like to raise about this topic that we haven't already discussed.

Clinicians were recruited prospectively during the periods November 2011 and March 2012 (telephone interviews) and May 2014 to April 2015 (face-to-face interviews). The contact details of those clinicians who agreed to participate, along with the MRQ asked and the advice provided, were recorded on a spreadsheet by the MI pharmacist who received the enquiry. For interviews by telephone, details were collated by each regional MI centre (Appendix 9) recruiting clinicians and emailed securely by a nominated person to myself as the lead investigator, using NHS net to ensure participant confidentiality. All spreadsheets were stored securely and only accessed by MI staff who needed to input the details of clinicians and their MRQ.

All clinicians who provisionally agreed to be interviewed were then contacted by myself via e-mail, with details about the study, including an information sheet explaining the research aim and what would happen if they decided they were happy to do an interview and be involved in the study (See Appendix 10 for a copy of the Information Sheet for the telephone interviews, and Appendix 11 and Appendix 12 for a copy of the Participant Information Sheet and Participant covering email for the face-to-face interviews). Clinicians were asked to select a suitable date and time to be interviewed and on the pre-agreed date and time they were contacted by telephone to do the interview, although if it was no longer convenient another date was arranged. For those interviews that were face-to-face, clinicians were reminded, by email or telephone, of the pre-agreed date and time and if necessary the meeting was rearranged.

All interviews were done at a time and location which was convenient for the clinician, usually after morning or afternoon surgery in their consultation room, clinic or office. Most of the face-to-face interviews were conducted in the GP/dental practice (n=11) after surgery hours. One face-to-face GP interview was after a morning hospital dermatology clinic, as they were a GP with a Special Interest (GPwSI). Another GP was interviewed early one morning in their home, as this was convenient for them and another at a prison, before they started an evening shift there. One dentist interview took place at lunchtime in a local café, after they had finished for the day, as there was no quiet space available at the dental practice.

For all interviews, clinicians that failed to respond to the initial e-mail invitation were sent up to two reminder e-mails at least 7 days apart (maximum time between e-mail 1 and 2 was 21 days and maximum time between email 2 and 3 was 26 days), then telephoned if no reply was received. Non-respondents were then deemed lost to follow-up.

Immediately before each interview (telephone and face-to-face), the identity of each participant was confirmed, they were reminded of the purpose of the study and consent verbally confirmed prior to beginning the interview. All interviews were audio-recorded using a digital voice recorder (Olympus VN-731PC). The voice recorder was switched on and checked to ensure it was recording (red light visible). A telephone pickup inner ear system (Olympus TP7), enabled both the voice of the interviewee and interviewer to be recorded during the telephone interviews. In the face-to-face interviews, the recorder was placed in between the interviewee and interviewer, although interviewees did not appear to be concerned about the presence of this device during the interview conversation and seemed to forget it was there (Gray, 2014; Oltmann, 2016; Bryman, 2016).

All interviews were transcribed verbatim (pauses/non-verbal communication were not recorded), either by myself (telephone interviews) or using a professional transcriber (face-to-face interviews). I checked each transcript against the audio to ensure each interview was correctly transcribed and to check technical terms. Consistent with the processes of ATA and GT, where possible each interview was coded before the next interview to allow alteration of the interview guide and to ask clinicians about new themes. However, coding each interview before the next was not always practical due to insufficient time before the next interview was scheduled. As a part-time PhD student, interviews and preliminary analysis were done on my days off i.e. outside of my MI work time.

In summary, the findings of my literature review shaped this research into being qualitative and exploratory in nature, where previous studies exploring the effects of MI advice on clinicians and patients had methodological limitations and minimal findings. To better understand how primary care clinicians used MI advice in shaping their prescribing decision-making and

subsequent patient care, I took an interpretive, idealist perspective and used a generic qualitative, interpretive exploratory methodological approach. I recruited prescribing clinicians nationally for interviews by telephone and then did more in-depth interviews as face-to-face, recruiting clinicians in one region in England.

My ethical considerations during this study

There were various ethical dilemmas which I needed to consider prior to and throughout my research. Firstly, I needed to consider the effect of my research on all those involved; including the clinicians, the MI staff who helped recruit potential participants and also on myself. I also needed to think about any issues regarding the involvement of the final year pharmacy students who physically helped me by doing some of the telephone interviews. Secondly, I also needed to consider the ethics regarding the fact that as MI pharmacist, I was an insider researcher doing the interviews. Finally, I needed to ensure the safety and confidentiality of the data once I had collected it, its storage and how I would use it in my analysis and within my thesis.

For clinicians, the main issues to consider were whether there was any potential for causing harm or deception, making sure they could give informed consent and ensuring their privacy. Although my research involved people, they were clinicians so I did not consider them to be vulnerable individuals, or that I was investigating anything that was likely to give grounds for offence or that it would be hazardous to the physical or psychological welfare of participants or myself as the researcher.

However, there was the potential for researcher vulnerability, according to interview location, especially for those done face-to-face, if they were not conducted in a public place (Williamson and Burns, 2014). I needed to ensure the interviews took place somewhere convenient for the participants where we could talk with minimal interruption and distraction. In some instances, the interviews were in a public place e.g. coffee shop but we avoided discussion of any identifiers. Although I did one interview in a GPs home, I felt comfortable doing this and ensured others knew where I was. On one occasion, a GP (male) asked if I could do the interview in the car before

starting an evening shift at a prison, however I did not feel this was appropriate, so this was done in a public waiting area.

Next for consideration were the ethical issues of utilising staff from the regional MI centres to recruit participants. They needed to know the recruitment protocol at the time they received a verbal or written answer to their medicines question, but to do so without coercion. I did this by ensuring the MI staff were aware of the study objectives, knew what to say to clinicians to get their provisional verbal consent to take part, and were aware how to forward clinician contact details to me. It was also necessary for me to have the details of the MRQ and MI advice provided, which meant the practicalities of transferring this information to me was also an issue. Finally, it was essential to ensure both the confidentiality of the enquirer, and the anonymity of the MI staff receiving and/or answering the question. To do this, eligible enquirers were asked to verbally consent to their details being shared with me. MI staff then emailed a digital copy of the question, research and answer from MiDatabank®. The names of MI staff who answered the question were removed from this copy, as their personal information was not required. All this data was transferred securely via NHS email.

To help address the ethical issues of avoiding coercion, gaining consent, confidentiality and data protection, MI centres were provisionally invited to take part via an email sent to the Director of each regional MI centre. If they, in principle agreed, they were sent a copy of the information sheet about the study which included my contact details at the university and those of my supervisory team (Appendix 10). Each Director was asked to nominate a lead contact at the centre to ensure continuity. I then emailed each of these lead contacts and asked them to confirm they understood the study objectives, along with when and how to recruit participants for this national study. They were asked to discuss the study with all MI staff and check all staff handling MRQs were able to recruit enquirers appropriately. Each MI centre was asked to agree a start date for recruitment and the nominated lead to email the relevant data at agreed times.

To ensure data protection and confidentiality when receiving the data from each MI centre, the title of each MRQ and the contact details of clinicians were

recorded on a spreadsheet and emailed securely to myself on a weekly basis. I needed the details of the MRQ to use as the basis of the interviews (telephone) but did not need to know the name(s) of the MI staff involved. To maintain MI staff confidentiality, MI centres were asked to download a copy of the MRQ and answer provided from MiDatabank® and apart from the clinician's details, to anonymise it and email it to me securely via NHS net.

Another ethical dilemma was whether to include multiple MRQs from the same clinician. As MI centres have clinicians who use the service on a regular basis, it was possible they would be asked to take part in my study on more than one occasion, with the potential of causing annoyance if they had previously declined. If they were happy to be interviewed for multiple MRQs, this was considered appropriate as the interview was primarily based on how they used patient-specific MI advice provided for each MRQ, in their decision-making and subsequent patient care. To keep a track of this, participating MI centres were asked to annotate MiDatabank® to indicate that they had asked the enquirer and if they had said yes or no about being a study participant; this could then be seen by MI staff if the same clinician subsequently contacted the service.

The next point to consider was contacting the clinicians who had provisionally agreed to be interviewed. I decided that email was the least intrusive, so they were contacted by email initially. A further dilemma was then how often and how many times to re-email or telephone them, if there was no response. There needed to be a balance between trying to get them to respond without seeming to pursue them excessively. In line with MI policy for contacting enquirers during the course of an enquiry, I decided that a further two emails, at a minimum of weekly intervals seemed fair. Then if there was no email response, they were contacted by telephone. If there was no reply they were not contacted again and recorded as lost to follow-up.

According to ethical principles, research participants have a right to withdraw from a study at any time. In my study, clinicians were treated professionally, as they would be if they were using the MI Service. They were advised that I was doing the research as part of a PhD with the University of Wolverhampton and that their details and comments would be kept securely, anonymised and

deleted after the research was completed. My contact details and the details of my supervisory team were included in all emails and on participant information sheets, in case they needed to ask questions or decided to withdraw from the study. At each stage of recruitment and the interview process, reasons for doing the research were clearly explained and they were able to withdraw from the research at any time.

Other ethical considerations were about conducting the actual interviews. I needed to ensure that busy clinicians were aware how long the interview might take and who would be doing the interviews. They also needed to consent to the interview being recorded, stored securely and transcribed, whilst maintaining their confidentiality. They were informed of this in the emails they were sent and consent was gained verbally just before the interviews by telephone, or by signing a consent form just before the interviews done as face-to-face.

I also had to think about the ethical issues of using the final year pharmacy students to help me with the interviews done by telephone, the potential risk to them and the participants. They needed to know about being polite and professional and maintaining confidentiality. Clinicians were told they were being interviewed by a pharmacy student. The final year students were trained (see the section on 'Steps taken to ensure rigour in this research') to do the interviews and supervised, by myself as the researcher and they had an introductory script to follow. If the interview discussion became difficult they were able to transfer the telephone interview call to me.

Another issue was the need for participants to know that I was an MI pharmacist as well as the researcher, rather than hiding the fact (see the section 'My reflexive approach to this research'). Throughout the recruitment and data collection for all interviews, participants were made aware of my role as the researcher and an MI pharmacist.

My next concern was for the safety and confidentiality of the data once I had collected it. Participant details were collated on a spreadsheet, stored securely and password protected. Interview data were audio-recorded, transcribed and all stored securely. After the interviews were completed, the audios were

securely stored on the voice recorder, uploaded as soon as possible onto a password protected computer and transcribed verbatim. Interviews were deleted off the recorder after uploading and checking. All interview data were anonymised by assigning a unique identifier to each transcript and password protected in NVivo (versions 8 and 10, QSR International Pty, Warrington, UK). As the researcher, only I had access to the all the data. The three pharmacy students had access to data for the telephone interviews only. The confidentiality and anonymity of clinicians and MI centres involved were considered during the publication of any papers and in writing this thesis. Any identifiers, such as names and places were removed, with each MI centre identified by a unique code, known only to myself as the researcher.

Finally, as part of the research ethics process, it is an important requirement to get approval from the appropriate ethics committees to ensure all ethical concerns have been considered. When I began this research (in 2010) there was a requirement to seek NHS research ethics committee (NREC) approval for research involving NHS staff. At that time, I was unsure whether conducting interviews by telephone with clinicians asking a MRQ, was classed as service evaluation, so not subject to National Research Ethics Service (NRES) approval. To clarify this, I emailed the details of my project to the local NREC chair and they advised that approval was not required. For the face-to-face interviews, I used the Health Research Authority (HRA) checklist (HRA, 2019). NREC approval was not required for face-to-face interviews as there was no direct patient/public involvement and NRES approval for conducting research with NHS staff was not required.

All the interview guides, email invitations, participant information sheets and consent forms were developed by myself, and approved by the School of Applied Sciences, Life Sciences Ethics Committee University of Wolverhampton. University ethics approval was obtained (April 2011) for the interviews by telephone, subject to the participant consent form being submitted, making it clearer to participants from the outset that interviews would be audio-recorded, and that the findings, but no individual data, would be available to participants upon request (Appendix 4). Ethics approval was

also obtained from the University of Wolverhampton for the face-to-face interviews (April 2014) (Appendix 6).

My analytical framework and data analysis

I analysed all interview transcriptions inductively using applied thematic analysis (ATA) and constant comparison, and within the framework of the research aim and objectives. ATA is not new, it is an inductive thematic analysis and is described by Guest *et al* (Guest, MacQueen and Namey, 2012) as one which rejects the view that qualitative data can be compartmentalised and ATA can use multiple analytical techniques. It is about trying to understand and explain the world in a rigorous, reliable and valid way and as such leans towards a positivist/interpretive approach. ATA blends elements from the many analytical methods and techniques. The view of the authors is that the 'greatest strength of ATA is its pragmatic focus on using whatever tools might be appropriate to get the analytical job done in a transparent, efficient and ethical manner' (Guest, MacQueen and Namey, 2012).

There were forty interview transcriptions (telephone) from 37 clinicians (26 GPs and 11 dentists), as three interviews were conducted on repeat callers who were GPs and a further fifteen face-to-face interview transcriptions (8 GPs and 7 dentists). I immersed myself in the data by reading all the interview transcriptions (telephone and face-to-face) several times. For each set of interview transcriptions, the text was analysed by coding each set of transcriptions separately.

First, I coded the telephone interviews inductively. To ensure a systematic approach while coding all interview transcripts, I used constant comparison, for example in the telephone interviews, I initially found 8 codes in the first interview transcript, the second I added 6 codes, the third a further 7, the fourth another 3 and so on. After coding, I re-checked previously coded interview transcripts and added the new codes if appropriate. A total of 111 free codes (nodes) were condensed/combined into 13 themes (tree nodes) and 64 codes (nodes). In total 3 full cycles of coding were completed for all telephone interviews, with fewer new codes added and only 1 code and no new codes added in the third cycle.

I did not have a pre-defined sample size, as I used inductive thematic analysis, so stopped data collection when thematic saturation occurred (Guest, Bunce and Johnson, 2006; Mason, 2010). That is, when I thought that no new themes relevant to the aim of this research seemed to be appearing in the interview data. For the interviews by telephone, thematic data saturation occurred by interview 43, as no new codes were emerging from the data. Copies of the codes I identified in the telephone transcriptions along with a summary of processes used are shown in Appendix 8: Inductive coding of the telephone interviews and then the face-to-face interviews. I then refined my codes and themes so my analysis was focussed and aligned with my research aim.

Initially, I derived the following themes from the telephone interviews; Advertising and publicity; Advice; Evidence; Financial; Knowledge; Medicines information; Patient outcome; Prescriber action; Prompts for calling MI; Referral; Resources; Risk Management; and Time factors. However, after coding and doing some analysis of the telephone interviews, I realised that more in-depth interviews were required to expand on my initial findings and further understand how clinicians use MI advice in their decision-making and patient care. These initial findings were used to develop the interview guide for the in-depth face-to-face interviews.

These face-to-face interviews were also inductively coded using constant comparison. In total 83 free codes (nodes) were condensed/combined into 9 themes (tree nodes) and 81 codes. The second cycle of coding found 3 new codes in interviews 11 and 12 and no new codes were found in interviews 13-15. Copies of the codes I identified in the face-to-face transcriptions, along with a summary of processes used are shown in Appendix 8: Inductive coding of the telephone interviews and then the face-to-face interviews. I then started to develop the themes further using the face-to-face interview codes.

I gradually combined my themes from the telephone interviews with those from the face-to-face interviews, using the research aim and objectives as my analytical framework and developed a modified set of themes. To illustrate this, copies of several documents showing the gradual process of combining and developing themes across both data sets (telephone and face-to-face

interviews) are shown in Appendix 8b. A transcription of an interview (face-to-face), from NVivo with coding and themes, is shown in Appendix 8c.

The final themes are shown in Table 3.3. Themes were eventually condensed into wider conceptual themes (meta-themes). As I combined the themes from both sets of interview transcriptions it became apparent that the interviewed clinicians described being influenced to seek MI advice by a wide range of issues (themes). It seemed to me that these fell into two major areas, which I felt were 'Domains of MI influence' and were descriptions around 'The motivating factors for clinicians deciding to seek MI advice' and 'The consequences of MI advice on clinicians'. Across all interviews, I found 19 themes, which I grouped into five wider conceptual meta-themes, also shown in Table 3.3.

During the inductive analytical process, I realised that clinicians interviewed were seeking MI advice for two reasons, because they were using MI as a 'Safety net' and as a 'Medicines help desk', so these are two of my chosen meta-themes. Similarly, there appeared to be three areas relating to the consequences of MI advice on clinicians and I have characterised these meta-themes as 'Impact on prescribing', 'Impact on patient care' and 'Impact on feelings'.

Each meta-theme is described and discussed and their associated themes illustrated with quotes taken from across all the interviews (Appendix 16: provides extracts from interview transcripts for selected themes). I have added the letter T or F to the interview number e.g. T3 (telephone interview number 3) or F5 (face-to-face interview number 5) to enable the reader to differentiate between quotes best representing the themes from interviews by telephone or face-to-face, from a range of clinicians. I have also added whether the quote was from a GP or a dentist with a brief enquiry title as appropriate, to contextualise the MRQ being described.

Table 3.3 Inductive interpretation of themes, meta-themes and domains identified in the interview data

The process of induction → The process of induction → The process of induction		
Theme	**Meta-theme**	**Domain of MI influence**
Providing a decision	**Safety net**	**The motivating factors for clinicians deciding to seek Medicines Information advice**
Confirming a decision		
Shaping a decision		
Clinical knowledge issues		
Technical knowledge issues		
Information resource issues		
Risk and medico-legal back-up		
Expert service	**Medicines 'help desk'**	
Trusted service		
Convenience		
Immediate change in prescribing	**Impact on prescribing**	**The consequences of Medicines Information advice on clinicians**
Enhancing prescribing		
Shift in prescribing practice		
Improving the clinician-patient relationship	**Impact on patient care**	
Reassuring patients		
Empowering patients		
Clinical effect		
Feeling reassured	**Impact on feelings**	
Feeling empowered		

Finally, I want to explain my rationale for inclusion/exclusion of some of the questions from the telephone interviews in this analysis. To re-iterate, these interviews included mostly open questions (Q2-4, 6, 7, 9-14, 16, and 18), designed to enable the clinicians to describe how they used MI advice in their decision-making and patient care. Although, some questions asked in these interviews are not specifically reported (Q1, 5, 15, 17), they were included to help open-up further description of the MRP clinicians were faced with, why they decided to contact MI and how they used MI advice in their prescribing decisions and patient care. For example, Q1 "Before contacting the MI Service

did you consult anyone else?" was included to help understand their decisions and actions prior to using the service and at what point they subsequently contacted MI. Others, i.e. Q8 "How helpful was the information in deciding how to manage the patient?", Q21, 22 are not specifically reported, as these were Likert scale questions which with hindsight were really about user satisfaction so not wholly relevant to the objectives of this research. Whereas, Question 19 "Did you record the Medicines Information advice in the patient notes?" is discussed in the theme: Risk and medico-legal back-up, along with supporting quotes from the face-to-face interviews.

Steps taken to ensure rigour in this research

It is important in all research to describe the steps taken to ensure rigour and trustworthiness regarding validity (credibility) and reliability (dependability). Although I found it somewhat confusing as to what guidance I should follow, as there has been a great deal of debate over the years and a lack of agreement regarding what this should entail for qualitative research.

In terms of validity (credibility), I needed to ensure internal validity i.e. how my research findings match reality, and external validity i.e. the extent to which my findings could be replicated to other environments (Bryman, 2016). This is perhaps more straightforward in survey research as validity is about ensuring the survey instrument measures what was intended. Whilst in qualitative research, validity has been termed 'credibility' or 'truth value' and is about being confident in the truth of study findings and being able to understand the context (Lincoln and Guba, 1985; Ulin, Robinson and Tolley, 2005; Charmaz, 2006). In doing this research, I have tried to ensure credibility by considering each of the questions suggested by Ulin *et al* (2005) as listed below and discuss these next:

- Has your research achieved intimate familiarity with the setting topic?
- Are the data sufficient to merit your claims? (Consider the range, number, and depth of observations in the data.)
- Have you made systematic comparisons between observations and between categories?
- Do the categories cover a wide range of empirical observations?
- Are there strong links between the gathered data and your argument and analysis?
- Has your research provided enough evidence for your claims to allow the reader to inform an independent assessment – and agree with your claims?

In the same way as that of quantitative research, where the researcher needs to make sure the results are reliable i.e. they are consistent and can be reproduced, this also needs to be ensured in qualitative research and is called 'dependability' (Bryman, 2016). I did this by making sure my research was consistent and carried out according to standards of qualitative methodology (Lincoln and Guba, 1985; Ulin, Robinson and Tolley, 2005). I have tried to ensure credibility and dependability at each stage of my research by referring to the Standards for Reporting Qualitative Research (SRQR) published by O'Brien *et al* (2014) by discussing all methodological aspects of this study adequately, appropriately and in a transparent manner. These main points are summarised in Table 3.4 and also discussed in the text after the table.

The techniques I used to help enhance credibility and dependability are listed in Table 3.4. As part of the research design stage and data collection, for the interviews by telephone I explained the research aim and discussed the interview questions with the three pharmacy students. These students also visited a local MI centre to help them understand the service. As the lead researcher I completed interview skills training as part of a qualitative research methods course (Qualitative interviews skills course 2013, Oxford). I then trained the pharmacy students so they could help conduct the interviews by telephone appropriately and they understood the questions in the interview guide. Each of us (myself and the three pharmacy students) did five practice interviews over the telephone with academic pharmacy staff (University of Wolverhampton), based on example MI questions. This was to ensure we were familiar with introducing ourselves, introducing the study to participants, gaining consent, the questions, using the audio recorder and ending the interview. I also completed two study days about NVivo (versions 8/10, QSR International Pty, Warrington, UK) to familiarise myself with the software, which I used to facilitate and organise my inductive analysis of all the interview transcripts.

Table 3.4 Techniques used in this study to enhance credibility and dependability

	Technique	Rationale
Research design stage	Used interviews by telephone and then face-to-face	Allowed comparison of results for convergence or divergence
	Pre-tested telephone interview guide with academic staff and the 3 final year pharmacy students who helped me with the telephone interviews	Ensured questions made sense to all doing the interviews by telephone, and clinicians
	Reviewed interview guides after 1st interviews	Ensured suitable for use
Data collection stage	Trained the three pharmacy students in data collection using practice scenarios	Training on purpose of the questions and probing techniques improves dependability
	Both semi-structured interview guides were designed in-line with the study aim and objectives The guide for face-to-face interviews was less structured as I was the only data collector	Increasing the structure of the data collection instrument increases ability to compare across data collectors i.e. for interviews by telephone Less structured instruments are good if exploratory research with one data collector i.e. for the interviews done face-to-face
Data analysis stage	Developed and used a clear codebook during my analysis	The codebook helped me find themes in the data
	Created an audit trail	Documenting steps in analysis and codebook revisions ensures transparency
	Triangulated data sources i.e. all interviews by telephone and face-to-face	Convergent data helps validate findings. This was achieved by similar and expanded findings across the telephone and face-to-face interviews
	Looked for negative or deviant cases during my analysis	This made me look for findings differing from the main findings
	Supported themes and interpretations with quotes across all the interviews (telephone and face-to-face)	Used verbatim quotes to connect my interpretations with what clinicians actually said

(Adapted from Guest *et al* 2012 pp99-101)

For all interviews, protocols were used during data collection, and when the final year pharmacy students did their interviews I was present, they were able to pause during the interview to ask me questions if necessary and I was able to intervene if needed. We also listened to each other during the interview, listened to the audio recording afterwards and then discussed any good points and areas for improvement. No questions were changed for the interviews by telephone, but there was flexibility to ask questions based on responses and to probe clinicians for more information.

As previously mentioned, all interviews were digitally recorded, transcribed verbatim and re-checked by myself against the audio. Although, the face-to-

face interview recordings were transcribed verbatim by a professional external transcriber (SL Typing Services, March 2019), I then listened to each audio and checked the transcribing was correct. The external transcriber was not familiar with all the medical and pharmaceutical terms used, so these were corrected by myself, along with anything else that had been misheard or misunderstood.

As I have already explained, both sets of interview transcriptions were inductively coded and systematically analysed. I developed a codebook using NVivo 8/10 software to organise the data and assigned codes (See Appendix 8). Code descriptions were added for clarity and recall if required. I also used a constant comparative process for coding each transcription and as new codes were added I then re-visited the earlier interview transcriptions and coded these with the new codes if appropriate. Then I combined and compared findings across all interviews, which was a means of triangulation, providing further support for the findings of my research.

I also revisited my coding and themes after 6 months to see if I agreed with my own initial findings. Coding was reviewed for four of the interviews done by telephone, by two of my supervisors, any differences discussed and codes amended as needed. During my analysis I also tried to look for negative or deviant cases to minimise data selection bias and the variety within various themes (Guest et al 2012). As previously explained, themes derived from clinician descriptions are also supported with quotes from a range of clinicians across all the interviews, to help provide a sense of context.

Nevertheless, I do recognise that there were limitations in my analysis. In some instances, another way to help ensure credibility in qualitative research is to carry out 'member checks' i.e. a copy of the interview transcript is sent to the interviewee for comment. In this study, it was not realistic to ask clinicians to also review transcriptions as they had already given up valuable time to take part in the interviews and it was highly unlikely they would do this as well. Finally, while some peer review of my coding of the interviews by telephone was done, this was not the case for the other interviews which were face-to-face due to supervisory team changes, lack of a suitably experienced person willing to do this and time constraints.

My reflexive approach to this research

For this study I used a generic qualitative, interpretive exploratory approach (Caelli, Ray and Mill, 2003; Kahlke, 2014; Auta, Strickland-Hodge and Maz, 2017) and here I explain my reflexive approach throughout this study, the boundaries of this research and the ethical implications of not using a specific methodology (Kahlke, 2014). I knew that to practise reflexivity, I needed to be critically aware, acknowledge and question the ways my own attitudes or beliefs might shape the data collection, analysis and interpretation (Guest et al 2012). As such it is important for me to clarify how my qualities, assumptions and my role and relationship with participants may have influenced the research process (O'Brien *et al.*, 2014). I will now discuss each of these in turn.

I now realise that it is not possible to be completely objective in qualitative research and that subjectivity is embraced (Koch 2004). Firstly, I acknowledge and appreciate that as pharmacist who qualified in 1992, with 15 years MI experience, including five years as a manager of MI Services, my own ontological assumptions and experiences will have inevitably influenced the data collection and analysis. Yet this was helpful in trying to understand clinician responses to the questions asked, as I felt able to probe more effectively being a fellow clinician conducting the interviews. This was one reason for conducting the in-depth face-to-face interviews myself, as in the telephone interviews the pharmacy students sometimes found it difficult to gain a rapport with clinicians over the telephone due to their limited experience of clinical discussions.

Secondly, all clinicians who were interviewed were made aware that the researcher was an MI pharmacist and for the face-to-face interviews they knew that I worked at the North West MI centre, although MRQs I answered were excluded. Thirdly, although the names of some clinicians were familiar to me as some of them had used the service for previous MRQs, I did not know any of them professionally. In reality, the relationship between MI staff and clinicians was invaluable in recruiting participants who were willing to be interviewed despite this taking up their time.

Next, as stated in my introduction to this thesis, my motivation for this research was based on the circumstances I found myself in around the time I embarked on this study. As a senior MI pharmacist I had a role as research lead, locally and nationally and I was acutely aware of MI 'impact' studies that had been completed using unsuitable methodology, with subsequent questionable findings. Also, an element of my research role was to try and inspire others to do research, so leading by example was important to me and having completed an MSc research project about MI, I wanted to do further MI research.

To further explain my reflexivity during the data collection and analysis process, I noted my thoughts, about how I may have influenced interviewee responses and/or have been influenced by interviewees themselves and their responses. Although inductive coding is subjective, my analysis was grounded in the data and while interviewee responses are also subjective, I conducted a systematic constant comparative analysis with development of themes supported by relevant, direct quotes from the data.

As a generic qualitative, interpretive exploratory approach was taken, this research was not aligned to a specific methodology. However, I have been transparent by clearly describing how this research was conducted and analysed and provided supporting quotes to illustrate the themes and enable the reader to review the findings and discussion themselves.

Finally, it was also inevitable that during the years of doing this part-time research, that my supervisory team would change. In fact the team has changed several times which has been rather challenging and disruptive. My first two Directors of Studies (DoS), based in the Faculty of Science and Engineering (FSE), both left the team due to retirement. When my first DoS retired, an academic nurse with qualitative research experience from the Faculty of Education, Health and Wellbeing (FEHW) joined the supervisory team and subsequently became my third DoS in 2015, as there was no suitable candidate in the FSE. During this time, the Professor of Pharmacy Practice who had been on the team since the outset, moved to another university (December 2015).

Since there was no one with suitable pharmacy academic experience in FSE to supervise, I was transferred across to FEHW. At this time, a further nurse researcher joined the team, but left due to illness in July 2017, so now another experienced member of FEHW staff, with an education and qualitative research background is part of my supervisory team. Also, as is the nature of research, I found doing this study difficult and was perhaps initially somewhat naïve in my approach. This was a qualitative study, although I never set out to do a purely qualitative research project, so much of my study design (and data collection) was completed before supervisory team members with more extensive qualitative research experience were appointed. Although invaluable, this meant they were only really able to advise during final analysis and writing up.

Summary of this chapter

In this chapter, I have explained my philosophical position regarding my knowledge and understanding of the world, as well as why I chose a generic qualitative approach. I explain my use of interviews as my method, how they were conducted and my analytical approach using constant comparison for coding, and then finding themes in the data. As a partial-insider researcher, to try and ensure rigour and trustworthiness i.e. credibility and dependability throughout the research process, I adopted a reflexive, transparent and systematic approach throughout the study and during my analysis. The findings of my constant comparative, thematic analysis across all these interviews are discussed in the next chapter.

Chapter 4 Findings and discussion

Introduction to this chapter

My findings are related to the aim and objectives of this research, which were to better understand how primary care clinicians use MI advice; how MI advice influences prescribing clinicians in their decision-making; and how they think advice subsequently affects patient care. This chapter begins with an explanation of the main characteristics of clinicians interviewed, either by telephone or face-to-face; the MRQs which initiated each interview; and the interviews themselves. I then describe and discuss the combined interview findings from my inductive thematic analysis (as mentioned in Table 3.3). I have structured this around the meta-themes and domains. As previously mentioned, quotes are referenced with 'T' or 'F' to indicate whether they relate to a telephone or face-to-face interview.

Characteristics of clinicians, enquiries, and the interviews

A total of 55 interviews with 51 different clinicians were included in my analysis. Thirty-three were GPs and 18 were dentists. Thirty were female, of these 21 were GPs and 9 were dentists. Almost all clinicians (n=44, 86%) interviewed had used the service previously. This is a potential indicator of their prior satisfaction with the service (see telephone interview tool question 20 / face-to face interviews: pre-interview data collection form Appendix 15), although user satisfaction was not an objective of this study, it is perhaps reflected in their descriptions of MI Service use.

There was a broad range of experience regarding number of years qualified, ranging from 2 to 40 years, and as such clinician descriptions were not solely from those who were less experienced. Each MRQ asked by clinicians was categorised according to the enquiry type(s) based on standard UKMI enquiry codes used in MiDatabank®, for example 'choice of therapy', 'adverse effects', 'interaction' and shows the breadth of MRPs described across all interviews. Telephone interview times ranged from 4 - 16 minutes (mean time JR 9 min 9 sec, students 8 min 43 sec). However, all clinicians described how they used the service, and while a few were brief, the telephone interviews provided qualitative data for analysis. It is not surprising that the face-to-face

interview times were longer and ranged from 19 minutes to an hour; nine interviews were 30 minutes or more (mean 30 min 45 sec). Appendix 17 summarises demographic data from telephone interviews and the medicines questions asked. The same data from the face-to-face interviews are also shown in Appendix 18.

The motivating factors for clinicians deciding to seek MI advice and consequences of MI advice on clinicians

I have structured the findings and discussion around the themes and meta-themes described earlier (See Table 3.3) and they are now shown in Table 4.1 Motivating factors for clinicians deciding to seek MI advice and the consequences of MI advice on clinicians. Although this table contains the same information as Table 3.3, it is included here to show the reader the Domains of MI influence, Meta-themes and Themes in the order I discuss them.

As some of the themes are interlinked, I am going to discuss my findings around the framework of answering a MRQ, that is under various circumstances clinicians described how they sought MI advice, then how they used it to make a clinical/prescribing decision to enable patient care, as clinicians described seeking MI advice and using it as a safety net to provide, confirm and/or shape a decision (see Table 4.1).

Table 4.1 Motivating factors for clinicians deciding to seek MI advice and consequences of MI advice on clinicians

Domain of Medicines Information influence	Meta-theme	Theme
The motivating factors for clinicians deciding to seek Medicines Information advice	Safety net	Providing a decision
		Confirming a decision
		Shaping a decision
The consequences of Medicines Information advice on clinicians	Impact on prescribing	Immediate change in prescribing
		Enhancing prescribing
		Shift in prescribing practice
	Impact on patient care	Improving the clinician - patient relationship
		Reassuring patients
		Empowering patients
		Clinical effect
	Impact on feelings	Feeling reassured
		Feeling empowered
The motivating factors for clinicians deciding to seek Medicines Information advice	Safety net	Clinical knowledge issues
		Technical knowledge issues
		Information resource issues
		Risk and medico-legal back-up
	Medicines 'help desk'	Expert service
		Trusted service
		Convenience

Next, I discuss the findings in Table 4.1 that relate to the consequences of MI advice on clinicians regarding their descriptions around impact on their prescribing i.e. to make immediate changes in prescribing, by enhancing prescribing and/or shifting prescribing practice (see Table 4.1). Finally, I discuss my findings based on their descriptions of impact on patient care (i.e. improving the clinician-patient relationship, reassuring patients, empowering patients and/or clinical effect) (see Table 4.1); which is why I have called the next section 'The place of Medicines Information advice in clinician decision-making, prescribing and patient care'.

After the section mentioned above, I then describe and discuss my findings relating to clinician descriptions of MI advice on their feelings, i.e. 'impact on feelings' (feeling reassured and/or empowered) (see Table 4.1). The other findings from Table 4.1, around their expressions regarding using the MI Service as a 'safety net' because of clinical and/or technical knowledge issues, and/or information resources issues, or for risk and medico-legal back-up, are described and discussed later in a separate section. Finally, their views of the MI Service as an expert, trusted, convenient service i.e. a 'medicines help desk' are described and discussed.

The place of Medicines Information advice in clinician decision-making, prescribing and patient care

I have extracted all the themes from Table 4.1 which are relevant here and these are shown below in Table 4.2.

Table 4.2 Domains, meta-themes and themes about clinician decision-making, prescribing and patient care

Domain of Medicines Information influence	Meta-theme	Theme
The motivating factors for clinicians deciding to seek Medicines Information advice	Safety net	Providing a decision
		Confirming a decision
		Shaping a decision
The consequences of Medicines Information advice on clinicians	Impact on prescribing	Immediate change in prescribing
		Enhancing prescribing
		Shift in prescribing practice
	Impact on patient care	Improving the clinician - patient relationship
		Reassuring patients
		Empowering patients
		Clinical effect

There were various factors which saw clinicians deciding to seek MI advice because they needed to make a prescribing decision about a patient. There appeared to be a 'trigger point', at which stage they contacted the MI Service, because for some reason they were unable to answer the medicines question themselves. I am now going to discuss the meta-themes, 'Safety net', 'Impact on prescribing' and 'Impact on patient care' in three sections entitled; 'Medicines Information advice as a safety net for clinician decision-making', 'The effects of Medicines Information advice on clinicians and their prescribing' and 'The effects of Medicines Information advice on clinicians and their patient care'.

Medicines Information advice as a safety net for clinician decision-making

In the findings of my research, I have used the term 'Safety net' to describe how clinicians wanted support, security and back-up in their clinical decision-making so they felt able to prescribe safely and appropriately, and in case of patient complaint. Although not the same, this is analogous to 'safety-netting' used by clinicians during patient consultations which was first described by Neighbour to help ensure patients know what to do if their condition subsequently changes (Neighbour, 2004; Silverston, 2014). As exemplified in these extracts, clinicians were using MI advice as a security blanket to check and defend their decision-making when they were prescribing;

> *"I'm happy to take advice off someone, it's nice to have a safety backdrop, just to give you kind of more of a certainty on what you're doing..."* (F5 Dentist)

> *"…you want to know what you're prescribing is safe and been used before"* (F3 GP).

The motivating factors for clinicians seeking and using MI advice as a 'Safety net' were broadly about them wanting support for their decision-making, although some expressed this more specifically as MI providing them with a decision, or confirming, or shaping a decision. Clinical decision-making is a complex process which takes place when clinicians make diagnostic and treatment decisions. As stated in Chapter 2, it is thought that clinicians make their decisions using the 'dual process' theory of decision-making. Clinicians mostly use System 1 processes which are based on their existing 'tacit knowledge' and 'mindlines', only switching to System 2 decision-making when they consciously override System 1 (Bate *et al.*, 2012; Gabbay and le May, 2016; Wieringa and Greenhalgh, 2015). System 1 processing is quick and intuitive and enables them to make a patient-centred diagnostic or treatment decision without needing to consult more widely (Bate *et al.*, 2012). I have linked my findings to the different elements of decision-making and these are further explained in line with the 'dual process' theory of decision-making. Overall, I found that they sought MI advice when they switched to System 2 thinking.

Clinicians mainly sought MI advice about medicines when they had a clinical dilemma and did not know what to do and were running out of options, particularly for complex or high risk cases. Although a high risk case may not be as multifactorial as a complex case, they were classed as such by clinicians because the question was about use of medicines in pregnancy, breast feeding, paediatrics, medicine choice in a history of allergy or severe adverse effects. These question types are often difficult to answer because the medicine is not licensed for use in those circumstances, data are lacking, not easy to find, or require clinical interpretation.

Providing a decision: MI advice certainly had a positive influence on clinician decision-making as MI staff sometimes made the decision for them. This was expressed by clinicians when they said they used MI advice exactly i.e. did what MI said with statements such as *"…made my decision for me"* (T4 GP)*; "…told me what to do"* (T1 Dentist). They valued the fact that MI answered their question "*fully basically, gave me all the information I needed*" (T4 GP) (Use of mirtazapine in a patient on warfarin). Doing what MI said was particularly important for another GP who asked about how to restart lamotrigine in a vulnerable patient who had decided to stop their medicine a few weeks before;

> *"They* [MI] *gave me some information about how I was going to manage it, logistically they told me how I was going to manage it.* […] *so it wasn't just a just a vague answer – I did what they said"* (T37).

This illustrates that when making prescribing decisions, clinicians had already made a conscious decision to seek MI advice for their System 2 decision-making. When the MI Service were providing a decision, clinicians did not want and/or need to interpret the advice further and were able to use it directly. In other words, the MI Service were doing System 2 decision-making for the clinician.

It is not surprising that clinicians sometimes need to check elsewhere, particularly for advice about management of uncommon conditions with unfamiliar medicines. When clinicians did not know what to do next, they used the MI Service to provide them with a decision. That is, they felt the advice they were given was sufficient to enable them to sort out the problem

they had at the time without having to do anything else. They have limited additional capacity and do not necessarily have time to consider all the variables when they need to prescribe another medicine (Zwolsman, 2012; Del Fiol, Workman and Gorman, 2014; Baird *et al.*, 2016). As GPs are 'expert generalists', they know about the management of a wide range of common clinical conditions, with limited specialist knowledge (Reeve *et al.*, 2013; Reeve, 2015). Similarly, although dentists should be familiar with a more restricted range of medicines they prescribe e.g. antibiotics used for spreading dental infections, such as amoxicillin or metronidazole, or analgesics for pain relief, they generally do not know much about the numerous medicines patients take for conditions not associated with dental care. Whilst they may be happy to answer simple questions using texts such as the BNF, they may not have the time, resources, expertise or skills to handle complex medicines questions.

Sometimes clinicians had tried to do their own research i.e. to use their System 2 decision-making, but they contacted MI because they were struggling to know what to do and wanted to discuss the problem with someone else. This dentist explains the pressures they are under when they cannot do a dental intervention and have other patients waiting. The patient in question was complex and presented with a worsening infection, the dentist needed to prescribe an antibiotic and needed 'just in time' advice without having to wait;

> *"…in a, 'an emergency situation' is probably a bit strong a word, but it is in the situation where everything else has failed me, right, well what, what are we doing now, you know, he's allergic so I've got to give this, or she's taking that but I want her to take this, and you need to take it, I want you to take it now to get you out of discomfort…*[…]*…antibiotics really was going to be our last, it was our last port of call really, so I needed to prescribe it 'cause the others hadn't worked, our other measures we didn't feel were working…'* (F9) (Amoxicillin with dabigatran).

The management of patient's taking medicines new to the market caused clinical uncertainty for clinicians, with MI providing them with a decision. For example, MI advice provided dentists with decisions about safe management

of patients taking a new anticoagulant medicine, dabigatran, which they knew little about. Several dentists described having a clinical dilemma when they needed to do a tooth extraction and did not know if they had to stop the medicine before this procedure;

> *"…so we were in a little bit of limbo situation* […] *we weren't quite sure which way to go with it"* (F11).

Provision of definitive advice to GPs for their complex patients, such as prescribing medicines in older, nursing home patients was useful, as this GP explains,

> *"The thing with polypharmacy, where it comes in is when nursing home patients, some elderly, some patients with a complex past medical history, a lot of medications and then you're adding in a new substance, or changing the dose where you haven't got much experience with it* (JR:Yeah)*… or the information, you can't find in, then it's quite useful"* (F13).

Another GP had a 'tricky patient' who had chronic kidney disease and needed more analgesia to manage their neuropathic pain. Specific MI advice about using higher doses of gabapentin helped them with their dilemma and was appreciated as they could do what the patient wanted;

> *"…because of the CKD* [chronic kidney disease]*, the dose was restricted, she asked if she could have more, her current medication now, she's on Matrifen* [Fentanyl patch] *which somehow or other managed to get bumped up to, I think it's 100mcg …(JR: Right)…and a little bit of codeine at night if she woke up with pain …(JR: Yeah)… and gabapentin, she couldn't tolerate tricyclics at all, so upping her Gabapentin was a good option really"* (F15) (High dose gabapentin in CKD).

These examples illustrate the difficulties primary care clinicians face, particularly as patients are becoming increasingly complex due to ageing and frailty, concomitant diseases and multiple medicines (NHS England, Royal College of General Practitioners, and Health Education England, 2016). With the focus on treating the patient closer to home, the number and complexity of consultations in general practice has risen dramatically in the last 10 years (Baird *et al.*, 2016).

This study found that MI Service advice enabled GPs and dentists to make prescribing decisions about patients who were difficult to manage, whether because of long term health conditions or complex medicines regimes, and in some instances allowed them to manage the patient rather than refer them to secondary care. A clinician felt MI advice about use of amitriptyline for pain in early pregnancy was "*crucial".* They were not sure if it was better to wait for the patient to see the pain team or just help her because it was going to be a few days before she was going to be seen (T38 GP). Asking MI for advice therefore stopped the clinician referring to a clinical specialist and meant they could decide what to do without the patient having to wait. Another clinician described using the MI Service when they did not know what to do because they wanted to know which medicine they could prescribe for a mental health problem in pregnancy and their patient did not meet the threshold for a mental health referral;

> "…*those sort of things where you're not, you know sure what medication to prescribe; I mean normally we'll go through the psychiatrist for that but…*(JR: right)…*occasionally there'll be patients that aren't at a level where they need psychiatric intervention*" (F12 GP).

Contraindications to medicines also caused clinical uncertainty when prescribing in high risk situations. Clinicians valued definitive advice when the patient had already taken a potentially harmful medicine, such as avoiding a 'statin' in early pregnancy*;*

> *"When it said in the BNF, you know, not to be prescribed in pregnancy, that's when you know I thought I need to get a bit more information"* (F14 GP) (Simvastatin in early pregnancy).

They also wanted to be told what to do before prescribing a medicine that was contraindicated in a high risk case, for example when prescribing an antifungal to a woman who was breast feeding a neonate;

> *"I think it was… either six or eight weeks where they were sort of saying, you know, it was either stressing avoid, or using caution, so I thought that's why I'd ask for some advice"* (F12 GP).

Confirming a decision: Rather than relying on what they had found in a core resource such as the BNF, which one GP described as being "*like a bible sort of*

thing", sometimes clinicians still wanted MI advice. Even though they said they had already made a prescribing decision i.e. they had made a decision but then decided to check their thinking by getting a second opinion. In other words clinicians used MI as a safety net to check their own 'mindlines' or System 2 decision-making, particularly when they began to have self-doubts or were worried about prescribing certain medicines. A dentist described this prescribing uncertainty as having the *"occasional niggle"* and one GP as;

> *"…sometimes you've got an idea about what you might, or might not, do, and I think it's helpful to get a more, you know, more expert opinion about that to confirm what, you know, which hopefully confirm what you were thinking already"* (F14).

This is an important finding as despite clinicians having a plethora of information resources available to them, ranging from their prescribing systems to utilising a range of human resource options, they were still using MI as a safety net to confirm their next course of action. This thinking was expressed by clinicians verbalising that they were seeking confirmation for what they had already tentatively decided. The interview extracts certainly show that some sought MI advice to verify their own thinking, particularly for difficult cases. This is illustrated by one GP who had a question about a complex patient who needed treatment for depression. The patient had a history of coronary artery bypass graft (CABG) and myocardial infarction a few years ago, plus diabetes and gout, managed with multiple medicines. The GP thought they knew what to do but wanted to confirm that sertraline was the best option from the range of antidepressants. They had an;

> "*inkling that it was going to be sertraline"…"it's not uncommon that one ends up treating patients for depression with cardiovascular disease and I had an incident before where I inherited a patient who was on a tricyclic which I didn't think was going to be the right drug and I remembered that it was likely to be an SSRI and I wanted to check that it was still going to be sertraline"* (T15 GP).

The MI Service verbally advised that tricyclic antidepressants and venlafaxine were not suitable and confirmed that sertraline was the best option post myocardial infarction, with mirtazapine as an alternative.

Medicines optimisation issues also challenged clinician decision-making. One clinician needed to know how to switch from one antidepressant to another (citalopram to sertraline) and was concerned about the risk of serotonin syndrome; specific MI advice about a potential patient safety issue was described as having;

> "*a big influence in terms of confirming that it* was *the correct thing pharmacologically to do"* (T23 GP).

As is the case for GPs, dentists are also under increasing workload pressures. Not surprisingly dentists also wanted a second check when they had a complex patient in the dental chair or waiting room, on an extensive medication list;

> *"Sometimes someone will come in with a whole 20, 25 tablets, and to manually check it, it's going to be a bit difficult even though I, you know you, there may be very little effects, say from amoxicillin I still would probably get it and have a look, just maybe more as a reassurance than anything else"* (F4).

Dentists sometimes wanted to double-check or confirm their thinking about antibiotic prescribing when they had run out of dental treatment options;

> *"I think realistically it's usually for something that I'll know is going to be all right but I just want that, that bit o' back-up, so clinically I suppose I've already made the decision because that's in the* [dental treatment] *pathway,*[…] *usually in dentistry it's going to be antibiotic prescribing and that's going to be your last option anyway, if your local* [dental] *measures haven't worked "* (F9).

Shaping a decision: It was apparent that sometimes clinicians were unable to make a decision themselves, and needed MI advice to help them shape their decision. During the interviews, clinicians described how they needed advice to help them formulate or shape their own decision. By asking MI, clinicians were able to make an informed decision about choice of therapy using the advice they received. A GP was unsure what to do in an 11-year old as they could not use a tetracycline because NICE guidance about acne treatment states use from 12 years of age. This helped them;

"to make an informed decision basically I guess, so that the patient was happy getting some treatment that was evidence-based" (T35 GP).

This shaping of a decision was apparent as the MI pharmacist advised that the GP could prescribe Zineryt®, a topical erythromycin containing product instead, as this could be used in children; and confirmed the avoidance of tetracyclines because of detrimental effects on the teeth and bones.

A more complex case required MI advice to help the clinician formulate a person-centred clinical plan. A GP needed to make a treatment choice about post herpetic neuralgia for a 91-year old nursing home patient who was taking phenytoin for epilepsy, as well as co-codamol for pain relief. They were considering prescribing amitriptyline and were struggling as NICE guidance on treatment of neuropathic pain does not specifically consider what to do in a patient with epilepsy. MI advised avoiding amitriptyline as this can lower the seizure threshold. Instead they suggested using a licensed medicine, pregabalin as per NICE guidance. When the GP asked about gabapentin because it was cheaper and also licensed for pain, although not in the NICE guidance, MI agreed this was another option. Here the GP describes what happened after getting MI advice;

"Read advice and prescribed gabapentin for this lady…..I didn't prescribe amitriptyline which I was thinking about with the phenytoin. I was informed by [the MI Pharmacist] *that amitriptyline is not licensed for neuropathic pain and the dose is much lower than antidepressant. Basically we looked at pregabalin and gabapentin and because of the cost of pregabalin decided to go for gabapentin"* (T20).

As this patient was older with renal impairment (CKD stage 3) and at risk of central nervous system effects, MI also advised to start at a low dose and increase the dose slowly. To add to the complex nature of this case, there was the potential for interactions with epilepsy medicines, some of which can be used for neuropathic pain as well.

It is notable that prior to asking MI, this GP very nearly decided to rely on their own 'mindlines';

"…potentially I could of, which hopefully I wouldn't have done, prescribed the amitriptyline anyway and hoped for the best" (T20).

Had they not spoken to MI, they might have prescribed amitriptyline, which is not appropriate in epilepsy and this could have put the patient at risk of having a seizure.

It is understandable that they wanted advice to shape their decisions as there are lots of elements to consider when making complex medicines decisions. Such as, if there are interactions with other medicines (prescribed, over-the-counter (OTC) and complementary); dose adjustments based on current renal and hepatic function, both of which decline with age; contraindications with underlying medical conditions and any previous allergies. This is in addition to the actual practicalities of adding a medicine to an already complex medicines regimen. For example, if the medicine requires additional monitoring, this may mean frequent visits to a clinic. Finally, making a prescribing decision should also involve reviewing existing medication and deciding if any can be stopped or doses reduced.

Clinicians also sought MI advice to help them shape decisions for their high risk cases**,** particularly when they needed to weigh-up the range of treatment options before deciding what to do. In this case, the clinician described their dilemma about choosing analgesic treatment in pregnancy and contacted the MI pharmacist for help;

> *"I had a feeling that low dose codeine, 8/500 was probably going to be OK, but I thought 30/500 is definitely out, […] I thought OK I'll ring you guys and see what you can help me with"* (F6 GP).

The MI Service checked all the major drugs in pregnancy resources, then searched the literature. They then advised that if paracetamol was not sufficient, codeine, even at higher 30mg doses, and non-steroidal anti-inflammatory drugs could also be used outside the first trimester.

Finding answers to difficult prescribing situations is complicated, as practical, person-centred information is often lacking. When selecting a medicine, there are a variety of factors to consider, including whether the medicine is likely to be of sufficient clinical benefit to the patient (Marshall, M. and Bibby, 2011). Use of medicines in pregnancy is undoubtedly a high risk area of prescribing, as the clinician needs to consider the potential risk to the unborn baby as well as the pregnant woman. For ethical reasons, pharmaceutical companies

cannot do clinical trials in pregnant women, which means first-line medicines reference sources, such as the BNF and eMC tend to just say the medicine should not be used in pregnancy or at best provide minimal, cautious information. Clinicians are sometimes more cautious and avoid prescribing medicines in pregnancy, which may mean the woman is potentially denied suitable medical treatment (Pharmacy Humber NHS Foundation Trust, 2013).

To summarise, primary care clinicians used MI advice as a safety net for their decision-making, that is when they consciously switch to System 2 decision-making thought processes. However, this more deductive and analytical approach is slower, requires research into the problem and is not easy to do, and on these occasions they seek MI advice. As I have already explained, the premise of the dual process theory of decision-making means that when clinicians do not know the answer, they are unable to use their own knowledge (System 1) and so switch to System 2 decision-making. This dual process theory can be linked to a cycle of learning, where clinicians switch from being 'unconsciously competent' (i.e. using System 1) to 'consciously incompetent' (needing to use System 2) (Croskerry and Norman, 2008; Croskerry and Nimmo, 2011; Bate *et al.*, 2012). The result being the need to acquire new knowledge, either by doing their own research or by asking someone else to help them with their complex decision-making. Although, if they think their own knowledge is correct, they will not switch to System 2 and are thus 'unconsciously incompetent'.

In both the telephone and face-to-face interviews, primary care clinicians were describing how they were sometimes unable to make prescribing decisions, particularly for complex or high risk cases and/or those where the answer was difficult to find, so they used MI as a safety net. Sometimes, MI staff told them what to do and then they acted on it, or MI helped shape their thought processes so they were able to make a decision. In some cases, MI advice was so specific e.g. about an interaction or use of a medicine in pregnancy, the clinician knew what to do and acted on it, so did not need to find any other information to make their decision. In short, making prescribing choices about complex and/or high risk cases requires intensive System 2 research and decision-making and is a complicated, multifactorial, time consuming process

with which clinicians need support. The MI Service therefore plays a key role in decision-making for the clinician by taking over their System 2 decision-making. Sometimes, clinicians used MI advice to get a second opinion and to confirm what they were thinking. In these cases, it is proposed that they were using MI advice to 'calibrate' their System 1 thinking and to update their tacit knowledge and 'mindlines' (Croskerry and Nimmo, 2011). It is my view that clinicians valued using MI for joint decision-making, they were using the MI Service as a 'knowledge broker' and as such the service forms part of their 'community of practice' (Gabbay and le May, 2004; Lomas, 2007; Soubhi *et al.*, 2010). In the next section I will describe and discuss the effect of MI advice on clinicians, their prescribing and patient care.

The effects of Medicines Information advice on clinicians and their prescribing

In the previous section I described and discussed the elements around clinicians seeking MI advice when they were making decisions about prescribing medicines. Although decision-making and prescribing are closely linked, this section is subtly different as it is more specifically around descriptions of the effect of MI advice on clinicians in terms of their prescribing for the patient in question, and its effect on their subsequent prescribing practice with future patients. (Themes about prescribing and patient care are listed in Table 4.2).

Immediate change in prescribing: After making a decision, clinicians then described how they used MI advice to make a prescribing change for the patient. Fundamentally, MI advice was patient specific and/or detailed enough to enable clinicians to make an immediate, clear-cut prescribing change without having to consider or do anything else. For some the advice was followed '*to the letter'* and particularly important to ensure best care was given. For example, for one dentist, advice enabled local anaesthetic prescribing and avoided the patient being labelled as having an allergy to a local anaesthetic and them having any further adverse reactions to adrenalin;

"so I contacted [name of MI pharmacist] *to ask her advice and she replied with a very considered response, which was, no, she felt this was a reaction with the adrenalin in the local, and the outcome of it is that we've now used adrenalin-free local with the guy and not had a repeat of the same problem"* (F2 Dentist).

Clinicians acted upon the information provided as it directly informed how they managed their patients. This was also a recurring issue identified in almost all telephone interviews, and is exemplified by this GP who said;

"they just gave me the information about how I was going to manage it, logistically they told me how I was going to manage it…" (T37).

Enhancing prescribing: Besides clinicians immediately being able to make a prescribing change for the patient after getting MI advice, most described how their prescribing was enhanced or improved, either because they felt the evidence-base was improved and/or their prescribing was safer. When asked about safer prescribing (in the face-to-face interviews), clinicians felt their prescribing was safer by receiving evidence-based MI advice;

"Whenever I've had problems previously, […..] *I've felt then confident to use that information that you've given to you know, then to take forward with the patient and you know hopefully…treat them in a fairly safe manner"* (F11 Dentist).

A GP also expressed the issue of safer prescribing as;

"…rather than taking an educated guess and then taking a risk sort of thing and not being very sure, I think it's always a good idea [to contact MI]*…"* (F13).

That is, they were using MI advice to help inform their micro-prescribing decisions (Gabbay and le May, 2004; Grant, Sullivan and Dowell, 2013; Wieringa and Greenhalgh, 2015).

This dentist explained how a safety issue was raised by the MI Service when he contacted them with an enquiry. The patient was taking two beta-blockers when they should have only been taking one and because they were made aware of a medication error, they were then able to clarify it with the patient and their GP and get one of the beta-blockers stopped;

"…I asked the patient and she said "oh yeah, I'm taking both of those," and then we had to check with the doctor, and the doctor said 'oh no the atenolol was dropped,' so I was made aware of things [by the MI Service] *which I wouldn't have picked up on"* (F4).

MI staff were able to alert clinicians to other clinical issues they were unware of and thus change their prescribing or the prescribing of others. It is the role of all pharmacists, including those in MI, to be aware of all the medicines the patient is taking or using and anything that may impact on this, (e.g. mobility problems, living alone), and to highlight all relevant medicines concerns to other clinicians.

Shift in prescribing practice: A shift in prescribing practice was portrayed by clinicians, as they explained how they could reapply MI advice with future patients to help them prescribe safely, as in this example from a dentist;

"*In future I know if I'm in a similar situation that I can give it and now I know that metronidazole is safe*" (in a patient with a history of stomach ulcers) (T27 Dentist).

Further examples of this shift in prescribing were also noted, with a different dentist, changing his practice about antibiotic interactions;

"…so you change your practice in terms of what you know, this is, I'm fine with this and you can prescribe it, so the information I suppose gets reinforced in your sort of own knowledge of what you can and what you can't prescribe, what interacts, what doesn't interact";

also selecting the safest antihistamines based on central nervous system effects;

"*it does affect my decisions that I make in the future for patients taking antihistamines, I know which one's drowsy, and which one's not going to be drowsy…"* (F4).

Similarly, advice about use of analgesia in pregnancy enabled a change in a GPs prescribing practice by updating their clinical knowledge and giving them the confidence to prescribe safely in pregnancy. In this instance, the GP was surprised they could use codeine and anti-inflammatory medicines in pregnancy;

"… now I understand that you know I can prescribe codeine and non-steroidals; […] *I thought they* [NSAIDs] *were a complete no-no in pregnancy.* […] *Since then I have seen other patients who have had pain in pregnancy, and it's given me like more confidence to advise them, and even* […] *last week I was actually speaking to a staff member who's pregnant and she's asked me about analgesia in pregnancy and I knew the advice to give her …"* (F6).

Changes in prescribing practice were also described by GPs through reusing previous advice with other patients. Here a GP explained how MI gave them;

"…some advice about using high dose fluconazole [in pregnancy] *and things like that, and that was an email I got, and then whenever this issue arises I* […] *re-use it"* (F6).

Some described this further as they mentioned storing copies of MI advice which they could quickly retrieve and re-use, by keeping this; 'useful information' on their email system or even in their desk drawer so they could easily access it;

"..*I've used it in repeat consultations* […] *I still use the information I got even a year or two ago with patients to talk about some alternatives"* (with respect to HRT) (F7 GP).

This re-use of MI advice describes how clinicians used it not only for the original patient enquiry but to update and inform their own clinical knowledge and future practice. That is they were using MI advice to inform their micro, and macro-prescribing decisions (Gabbay and le May, 2004; Grant, Sullivan and Dowell, 2013; Wieringa and Greenhalgh, 2015). A non-MI study looked at how clinicians make prescribing decisions and what influences them (Grant, Sullivan and Dowell, 2013), but did not find any major effects on improved prescribing per se. However, this study illustrates how clinicians used MI advice to develop their prescribing practice for subsequent patients. This appears to be by instilling confidence, incorporating it into their existing knowledge and storing information so they could refer to it. This is an important finding as no other MI studies have shown *how* MI advice has been used to inform prescribing for future patients (Hedegaard and Damkier, 2009; McEntee *et al.*, 2010; Innes, Bramley and Wills, 2014).

A further key finding from my interviews was that clinicians shared their newly acquired medicines knowledge with their colleagues to potentially improve prescribing within their wider 'community of practice'. Multiple examples of this sharing of good practice were noted and are exemplified with the following interview extracts; dentist (F9) stated they incorporated the latest advice about new anticoagulants into *"practising life"*, and this GP (T9) quote about obtaining a special paediatric product, i.e. a licensed melatonin preparation;

> *"Able to share it* [MI advice] *with my partners, the other doctors, so they were aware of it".*

The MI advice was shared in a variety of ways. For example, the advice provided to one dentist about the management of patients taking bisphosphonates for osteoporosis and the practicalities of dental treatment, due to the risk of osteonecrosis of the jaw, was shared with their colleagues;

> *"Once again the bisphosphonates, we've just adapted that as, as time's gone on, so em yeah, it's eh, yeah we've, it's certainly something we do use"* (F11 Dentist).

Some described sharing MI advice with others via email, IT networks or meetings, as these extracts illustrate;

> *"…so I'll put it on that resource there* [shared network]*…and email round saying "I had this issue today, this is the advice I was given, if you want further advice so people know where to go…"* (F12 GP) (8 GPs in the practice).
>
> "*…we have a server that runs all the computers in the surgery,* […..]*…so I said to the…, told all other the clinicians, you know, this document* [about new anticoagulants and bleeding risk] *might be helpful, and it's on our server, so that's accessible …"* (F9 Dentist) (6 dental staff in the practice).

Sharing MI advice at practice meetings or study groups was also described and valued by others;

> *"I've shared it* [MI advice] *with colleagues as well, you know we have a very, we have a regular meeting, so sometimes if I find out some new information, I can't think of specifically whether I've done it recently, but certainly it would be something that we would discuss"* (F7 GP).

"…this is something that I share at the study group and say "now I've used this and it's absolutely brilliant…" (F15 GP).

Other shifts in prescribing practice described were when MI advice was subsequently applied to a group of patients. This GP described using the advice provided for patient-specific questions (about taking a tricyclic antidepressant for pain) to review other patients in the practice who were on a similar combination of medicines;

"*Actually not just one patient, it's several patients. So we looked through all the patients that we'd got in the practice on citalopram and each individual doctor went through to see whether they were also on tricyclics in particular, but also other drugs that may affect the QT interval*" (T32).

In this case, clinicians in the practice used MI advice to manage the risk of a serious cardiovascular problem in a sub-group of patients who were taking citalopram with other antidepressants. This reveals how individual patient advice has the potential to be used for other patients which may then have a broader impact on patient care.

This is the first MI study to describe how clinicians actively share MI advice with their colleagues and how this effects subsequent practice of the individual and the wider health care team. Other MI studies have found that sometimes the advice provided was shared with another clinician (Stubbington *et al.*, 1998; McEntee *et al.*, 2010) or circulated to colleagues (Stubbington *et al.*, 1998; Hedegaard and Damkier, 2009), but they did not provide any description of the way this information was utilised to change individual prescribing decisions or how it was applied to whole practice populations. Only in the Schjøtt study did clinicians agree that MI advice caused a change in their practice (Schjøtt, Pomp and Gedde-Dahl, 2002). However, like other MI studies, the level of detail reported in this study was lacking and only reported that the enquirer was able to give more informed advice to colleagues.

My study is the first MI study to describe how MI advice was used to change the future practice of prescribing clinicians and their colleagues. This finding is particularly important as the influence of MI advice for an individual patient,

also being used for future patients and shared with clinical colleagues has not been fully appreciated by those who commission MI Services and previous MI studies have failed to describe this (Stubbington *et al.*, 1998; Schjøtt, Pomp and Gedde-Dahl, 2002; Bertsche, Hämmerlein and Schulz, 2007; Frost Widnes and SchjØtt, 2009; Hedegaard and Damkier, 2009; McEntee *et al.*, 2010; Bramley *et al.*, 2013; Innes, Bramley and Wills, 2014; Strobach *et al.*, 2015). This use of MI advice is synonymous with clinicians using their wider 'community of practice' (Wenger, McDermott and Schnyder 2002, David 2014) and the potential for MI advice to change the practice of prescribing clinicians asking the question, but also of other clinicians. Further, sharing of this advice is analogous with findings in the ethnographic study by Grant (2013), where information sharing at meetings, the coffee room and one-to-one in consulting rooms was seen as one factor to influence prescribing, and deemed to be an important factor for a practice to have high quality prescribing.

To summarise the effects of MI advice on prescribing, clinicians thought it was improved as they used MI advice to inform their prescribing especially for those complex or high risk cases. Additionally, they used MI advice for their challenging questions, which they felt were difficult to answer themselves for a variety of reasons, including those about drug interactions, adverse effects and prescribing/obtaining unlicensed or unusual products. They then felt able to make an immediate prescribing change for the patient based on the MI advice. Some also thought their prescribing was better and/or safer in some way because they knew their prescribing was informed by reliable evidence.

In addition to being able to act on MI advice and prescribing for their patients, clinicians also explained how they used advice to update their own knowledge i.e. using it then helped improve their 'mindlines' at the micro-prescribing level. In some cases, clinicians appeared to integrate MI advice into their System 1 decision-making as they changed their prescribing practice for subsequent patients i.e. they altered their prescribing practice. They were then able to use this new knowledge to shift their prescribing practice, and to subsequently use it with future patients. Importantly, they also described use of patient-specific advice to review the prescribing of similar patient groups with their other patient populations within their practice, thus potentially

avoiding similar problems for other patients. Equally important, they also said they used MI advice not only for their own patients and CPD but also shared it with their colleagues to inform their wider 'community of practice' and potentially improve the prescribing of other clinicians.

In this section, I have discussed and summarised my findings about the influence of MI advice on clinicians and their prescribing. In the next section I will describe and discuss the effects of MI advice on clinicians and patient care.

The effects of Medicines Information advice on clinicians and their patient care

With 'person-centred' care being advocated, clinicians need to consider the care of their patient, or rather the person, as a whole when making a prescribing decision (Barnett, 2018). Other MI studies have tried to evaluate the impact of MI advice on patient care (Cardoni and Thompson, 1978; Stubbington *et al.*, 1998; Melnyk, Shevchuk and Remillard, 2000; Bertsche, Hämmerlein and Schulz, 2007; Frost Widnes and SchjØtt, 2009; Bramley *et al.*, 2013; Innes, Bramley and Wills, 2014), but as mentioned in my review in Chapter 2, it is difficult to elucidate the effect(s) of MI advice on patients per se, as there are many other confounding factors. The findings of previous studies were based almost exclusively on pre-defined options, such as avoiding an ADR, termination of pregnancy or interaction (Stubbington *et al.*, 1998; Bertsche, Hämmerlein and Schulz, 2007; Frost Widnes and SchjØtt, 2009), and so artificially limit our understanding of what effect MI advice may have had. Through my work, as shown in table 4.2, the themes inductively coded and derived from clinician descriptions in the telephone and face-to-face interviews about the impact of MI advice on patient care, were about improving the clinician-patient relationship, reassuring patients, empowering patients and clinical effect. I will discuss each of these findings in turn.

Improving the clinician/patient relationship: While some patients may be happy to follow the clinician's advice with a traditional 'Doctor knows best' approach, others are now expecting a more equal relationship. Clinicians are now encouraged to practise SDM, with campaigns like Choosing Wisely (Choosing Wisely, 2019) providing support for patients and clinicians. The aim of SDM is to discuss different choices about care or treatment, along with their

risks and benefits and for a decision to be reached jointly (NICE, 2017). An important element of SDM is good communication between the patient and the clinician. This type of relationship was observed in the interviews regarding enquiries generated by some clinicians, as they said they had already discussed the issue with the patient before contacting MI;

> "*I already talked to the patient and said I was going to ask the drug info people"* (*a*bout an interaction with warfarin and mirtazapine) (T4 GP).

Being transparent with patients about things they were unsure of and checking with someone else was also apparent, as this GP explained;

> *"…think patients are always actually quite happy if you say to them I don't know the answer to your query"* (F7).

Several clinicians felt that because they made the effort to look into the problem it appeared to have a beneficial effect on their relationship with the patient, especially if the patient knew the clinician was contacting MI prior to making a decision;

> "*…definitely discussed it* [switching from citalopram to sertraline]*, I discuss all changes with the patient and negotiate any drug changes with the patient and they were happy for me to discuss it with* [MI] *and get a balanced view*" (T24 GP).

Others felt that patients were unconcerned about them checking with someone else, particularly for unfamiliar medicines and thought patients did not mind them checking elsewhere and appreciated the clinician taking the time to check;

> *"If I'm giving somebody amoxicillin for a chest infection I'm not too worried about that, but if it's giving something I'm less familiar with I will often look it up […?], I don't think patients mind it generally …"* (F15 GP).

After getting MI advice, they believed their relationship with the patient was improved because they were able to use it in a discussion with them about further treatment options;

> *"…was quite, quite happy (JR: M-mmm)… em, I wouldn't say 'impressed,' but you know oh great, yeah you can ring somebody and, and* […] *it wasn't a barrier,*[…] *I was quite upfront and said "look, it's changing all the time, let's get some current advice"* (F9 Dentist).

A different dentist felt able to have a patient discussion about something they were previously unsure of;

> *"…I could share it with eh, with the patient as well and discuss it 'cause it wasn't clear…"* (Use of miconazole oral gel with simvastatin, risk of interaction and adverse effects) (F10).

Clinicians also expressed that patients appreciated their efforts to resolve specific problems. In this example, a dentist contacted the MI Service around foetal exposure in pregnancy, and felt the patient appreciated what they had done as the advice helped allay concerns about risk to her unborn baby;

> *"she was really pleased that I'd taken time out to like look into it further, and just made sure we weren't giving her something* [High strength fluoride toothpaste] *that may have like done damage to the baby"* (F1 Dentist).

These examples highlight how MI advice was used to support and facilitate clinician/patient SDM.

Reassuring patients: Clinicians also felt patients were reassured by the advice they were able to give after speaking with MI, as well as improving their overall relationship with patients. This has previously been found in other MI studies, although findings reported tended to be superficial (Stubbington *et al.*, 1998; Bertsche, Hämmerlein and Schulz, 2007). In my study, the data derived allowed for greater context and meaning around the concept of reassurance. For example, clinicians felt able to have a more confident medicines conversation with the patient;

> *"…when the patient* [is] *aware* [they are] *being prescribed something which is safe for them — or presumed to be safe — and the doctor has more clinical confidence, they feel more confident"* (F13 GP).

Or that they felt able to articulate to patients no further actions were required in cases which could be seen as high risk (use of medicines in pregnancy, breastfeeding and children) For example, foetal exposure to an antibiotic;

> "*She was reassured, she felt reassured and just continued with her pregnancy as normal"* (Inadvertent exposure to metronidazole in the first trimester of pregnancy) (T12 GP).

Or as in the case of a mother who needed to take an antifungal for mastitis when she was breastfeeding a very young baby;

> *"I think mum felt reassured as well, em that was the main thing really"* (Antifungal in breastfeeding) (F12 GP).

Finally, a GP was able to reassure a worried parent, where their 2 year-old child had mistakenly been given an aspirin derivative (adult dental gel) and the parent had read on the label that it was contraindicated;

> "*It helped me to sort of reassure the mother and clarify that there was nothing else really to be done*" (T39 GP).

These examples illustrate how MI advice about unplanned use of medicines in the first trimester of pregnancy, appropriate use of a therapeutic dose of an anti-infective medicine in breastfeeding, and mistaken use of an adult medicine in a child all provided reassurance to both clinicians and their patients.

Empowering patients: Clinicians also spoke about how MI advice helped them discuss a treatment plan with the patient and perceived this as enabling SDM by empowering their patients. They spoke about using/showing the written MI advice provided with the patient to help inform decisions.
In this next case, where there was no definitive answer about a patient with a history of allergy to local anaesthetic, the dentist contacted MI for advice. The clinician was advised that the patient needed allergy testing to check for cross-sensitivity and considered the advice empowering for the patient, as it gave them the confidence to ask their GP for a referral to a specialist for tests;

> "*They also said it would still be advisable to get these allergies checked anyway* […..], *rather than potentially end up with a medical emergency on my hands and the patient was completely understanding about that and it also gave her the clout to go back to her GP and demand tests as well.*" (T29 Dentist).

Similarly, for the MRQ about use of analgesia in pregnancy, although the patient did not actually take the combined codeine/paracetamol, the GP felt MI advice was empowering because the patient was aware she could take it if necessary;

"She knew that there was a fall back, so it empowered her to, you know to understand that if she wasn't able to control the pain with whatever way she was controlling it — with paracetamol and the hot water bottle — then she could always come back and I'd have something for her, to fall back on (F6 GP).

Clinical effect: Previous MI studies have ascertained that clinicians do act on MI advice, such as continuing or discontinuing, not starting or starting medicines. Unfortunately, they have not provided specific details about how medicines were changed or what actually happened to the patient clinically as a possible effect of MI advice (Stubbington *et al.*, 1998; Schjøtt, Pomp and Gedde-Dahl, 2002; Bertsche, Hämmerlein and Schulz, 2007; Bramley *et al.*, 2009; Frost Widnes and SchjØtt, 2009; Hedegaard and Damkier, 2009; Bramley *et al.*, 2013; Innes, Bramley and Wills, 2014; Strobach *et al.*, 2015). However, in my study several patient treatment outcomes were known, and explained during the interviews. My research, unlike previous MI studies, has been able to provide further description about how clinicians used MI advice in their clinical care and treatment. For some, MI advice had an important effect on the management of the medical condition and/or treatment. Descriptions of resolution or stabilisation of their patient's condition were articulated after taking advice about how to safely switch from one medicine to another, as exemplified by this GP quote regarding switching antidepressants;

"They're having on-going treatment. It's early days at the moment, he's just on sertraline now and he's come off his citalopram and he's mentally stable" (T23).

Avoidance of a potential allergic reaction was an effect of MI advice when MI staff advised that it was safer to not use a local anaesthetic, as this dentist explains;

"The advice they gave me was that although the risk was fairly minimal, that there could have been potential cross interaction […], *rather than potentially end up with a medical emergency on my hands…*" (T29).

For those clinicians that knew what had happened to the patient after receiving MI advice, they were able to describe the effects MI advice had on the clinical care of the patient. The view was that MI advice helped clinicians

safely manage patients by providing practical advice over a variety of clinical dilemmas, whether that be switching medicines in chronic clinical conditions, such as depression, avoidance of a possible allergic reaction, the correct therapeutic dose in pregnancy, or when the clinician was using a sub-therapeutic dose.

MI advice also saw medicines being stopped or started and as such aligns with other MI work, although as interviews were used in my study, I was able to get a better understanding as to how and why. The below example highlights where a patient was prevented starting a medicine, as advice to the GP was to increase the dose of their existing treatment (for pain), rather than adding in a new antidepressant;

> "*What we did was not start a new antidepressant and work with the nortriptyline and have the scope for increasing that if necessary*" (T32).

Likewise, for another patient, on a long term medicine (aminophylline), MI advice resulted in the medicine being stopped and reviewed according to symptoms, rather than what the GP had been considering, which was switching them to theophylline and may not have been necessary;

> *"Because she's been on it for quite a long time we decided in the first instance to stop it rather than change it*" (T34).

A further example found that MI advice allowed the patient to be treated successfully for an infection. They advised the clinician to prescribe an antifungal pessary for a longer period of time (than recommended in non-pregnant women) for treatment of recurrent vaginal thrush during pregnancy. Then because the clinician knew what to do, they explained how they were able to treat the patient again when it recurred;

> *"it was a two week course of pessaries, which, you know at first thought you wouldn't think that would be great in a pregnant woman, but it worked really well and it was safe and we've used it again since"* (F3 GP).

Sometimes, MI advice helped prioritise the clinical treatment for multiple conditions and aided SDM. In this case, a husband asked the GP about his wife taking St John's wort with topiramate and they contacted MI. Controlling her migraine with the topiramate was the priority, and because of MI advice

she stopped taking the St John's wort as there was the potential for it to reduce her topiramate serum levels and migraine control, as;

> "...*it was more important for them at that moment in time to treat the migraine than to start the new medication*…" (F13 GP)**.**

This study shows how clinicians perceived the role of MI Services in directly contributing to the medicines optimisation agenda by having an effect on patient care through managing polypharmacy and, at times, helping with deprescribing (RPS, 2013; Drenth-van Maanen *et al.*, 2018; NICE, 2015). Clinicians described this as titrating rather than adding medicines and reviewing clinical need for continuing chronic treatments.

To summarise the effects of MI advice on clinicians and their patient care, clinicians explained how they thought it was better to be honest with patients when they did not know what to do, and communicated to the patient that they were going to ask a specialist service for medicines advice, particularly for their complex or high risk cases, or for answers that were difficult to find. Their view was that patients seemed to appreciate this fact, and they used MI advice implicitly in SDM discussions with their patients. Therefore, clinicians' thoughts were that because patients were aware they were contacting the MI Service, their relationship with the patient improved, and felt their advice provided reassurance and empowerment to patients. Some prescribers knew how MI advice had had a clinical effect on the patient, and enabled continuity of care.

Clinician feelings

The next theme I want to discuss is about clinicians and their feelings. The relevant themes extracted from Table 4.1 are shown below in Table 4.3. Earlier I discussed the themes of 'reassuring' and 'empowering' patients, see Table 4.2. Here, MI advice seemed to have an emotional effect on prescribing clinicians themselves and their frame of mind, as they described feeling reassured and empowered.

Table 4.3 Domains, meta-themes and themes about clinicians and their feelings

Domain of Medicines Information influence	Meta-theme	Theme
The consequences of Medicines Information advice on clinicians	**Impact on feelings**	**Feeling reassured**
		Feeling empowered

Feeling reassured: It was clear that when clinicians had to make decisions, they thought the advice they received had a positive effect on how they handled the problem as they found it reassuring. They described this as enabling them to make decisions that appeared to confer greater clinical confidence in managing patient problems, as these GPs explained;

> *"Gave me the confidence to do it when there are known interactions"* (Amoxicillin with methotrexate) (T22);
>
> *"Given me the confidence to move forward to help the patient manage what is in effect a tricky area of decision-making, without having to refer further"* (Venlafaxine in pregnancy) (T9).

Similarly, the value of discussing a question with the MI Service about the risks of using Bio-Oss® bone substitute material prior to a dental implant, was described by this dentist;

> *"…I was looking for reassurance that there was no BSE risk here, no prion disease risk here, … you know I couldn't have had a better response that completely reassured me that this was a material that was safe to use…"* (F2).

Feeling reassured and confident to have a patient discussion, after speaking with the MI pharmacist, was described by another GP;

> *"I use it* [MI advice] *to discuss with the patients, you know, we've done this, I've done this information gathering and database use, and all the rest of it, and it reassures me and them that the information's up to date*…[…..]…*also I think it helps, it makes you - as a doctor- you feel well-reassured"* (F3).

Reassurance was further expressed by a GP who needed help to make a prescribing decision, as they started to doubt themselves when they found conflicting information;

"you're pretty sure it's the right thing to do but because you've not being doing it all the time you've, […], it often is reassurance that it is the right thing to do… " (F12).

This reassurance was further described as feeling more confident i.e. they were reassured about a complex case, as a result of being able to discuss and share the decision-making. Discussing a medicines interaction dilemma, or a pregnancy question with the MI pharmacist was valued;

"I was more confident that eh, it wasn't going to be my own decision…" (F10 Dentist) (Miconazole oral gel with simvastatin);

"So once I got the advice that it's OK to prescribe non-steroidals and codeine in the first two trimesters then that gave me confidence" (F6 GP).

More specifically, other GPs expressed feeling more confident and comfortable about their prescribing;

"…so it gives a lot more confidence when you're giving a prescription or prescribing or advising something" (F13 GP);

"…I felt very much more comfortable that…(JR:OK)…the risks that we were taking by doing that were actually…worth it…" (F15 GP).

Feeling empowered: Another sentiment expressed by clinicians was feeling empowered. Some described how they felt enabled to manage the patient; *"It empowers the patient, it empowers me"* (T15 GP), sometimes as a result of feeling reassured and gaining confidence;

"I had a game plan of you know what the fall back was and what the next step was and it gave me more confidence in this regard" (F6 GP).

In certain circumstances, clinicians felt able to question other clinicians, explaining how they used MI advice as the impetus to help them challenge a specialist about why they had prescribed something controversial;

"…and drugs you're not familiar with…you know, when you get a letter from the hospital, you know, "do this… prescribe this and… if it's reasonable and something you've sort of heard of, but if it isn't I do sometimes write back and say "no, can you explain what we're doing here? - it's difficult" (F15 GP).

To summarise the effect of MI advice on clinicians and their feelings, they described feeling reassured and even empowered by MI advice when they were better informed. If someone is uncertain about what to do, they need to move from feeling uncertain to being more certain, by providing reassurance MI advice gave clinicians the confidence to move to being more certain, thus helping them to make a decision. They then felt better able to make prescribing decisions for their patients, or to question a decision made by those perceived as more powerful, e.g. a hospital specialist. My findings build on previous MI studies, which have, to a limited extent shown elements of reassurance, for example findings by Stubbington *et al* (1998). In addition, the concept of empowerment has not been reported previously.

Other reasons for using Medicines Information as a safety net

At the beginning of this chapter, I discussed my findings about clinicians using MI advice as a safety net for their decision-making. Here, I discuss how they used MI advice as a safety net because of a range of problems to do with knowledge, resources, risk and/or medico-legal concerns. I have extracted these themes from Table 4.1 for ease of reference and they are shown in Table 4.4. Descriptions of issues around clinical knowledge, technical knowledge and information resources, all relate to impeding prescribing and patient care. In other words, they were using MI advice to fill the gaps in their knowledge. Also apparent were their explanations linked to MI Service use to minimise risk to themselves and for medico-legal back-up. I will describe and discuss each of these in turn, starting with clinical knowledge issues.

Table 4.4 Domains, meta-themes and themes about knowledge, resources and risk

Domain of Medicines Information influence	Meta-theme	Theme
The motivating factors for clinicians deciding to seek Medicines Information advice	**Safety net**	**Clinical knowledge issues**
		Technical knowledge issues
		Information resource issues
		Risk and medico-legal back-up

Clinical knowledge issues: A key issue for clinicians was trying to keep up to date. Clinicians need to keep up to date to practise safely and effectively; mandatory CPD and revalidation is one mechanism by which regulators enforce this. Yet it is impossible to keep up to date about everything. Lone working or being in a small practice was felt to be particularly challenging when trying to keep up to date about clinical changes relating to medicines. As this dentist, who did their dental degree over 25 years ago (and relied on their joint partner in the practice) explains;

> "*…you do find as a dentist you are quite isolated really, and eh….I subscribe to the dental updates* […]*, and then generally I liaise with* [my colleague] *as well, 'cause he talks to other dentists, and things along those lines, which you know you don't really get, […] you didn't get taught at dental school"* (F11 Dentist).

Clinicians mostly used their colleagues and their wider 'community of practice' to help keep themselves updated. One coping strategy for keeping up to date, was to identify what secondary care specialists were prescribing. A GP explained;

> *"as new medications come on they're often used in secondary care more, so we get to know what's being used, say in the diabetic clinics and stuff, so we would see what our secondary, our expert colleagues are starting to use and as patients come out of hospital and those we become more familiar with"* (F7).

Clinicians described a range of information available to help them keep up to date, but articulated they struggled to manage the high volume of information;

> *"…there's a huge amount, a wealth of information out there, and how that gets disseminated to us as practitioners is a bit of an issue, when you're trying to fit in your continuing development and keeping up with everything"* (F7 GP).
>
> *"up to date with all those zillions of guidelines that drown you on a weekly basis* (JR: Yeah, yeah)…*if not a daily basis"* (F15 GP).

Given the high volume of new and changing information on medicines it is not surprising clinicians felt this way. This is compounded by the overwhelming array of online information available via a range of digital portals, all of which require appropriate training, skills and knowledge for clinicians to use them correctly, effectively and efficiently. The concepts of not knowing everything and difficulty in keeping up to date with constantly changing information about medicines were described by this GP who discussed antibiotic prescribing changes;

> *"a lot of the time the trends are changing, so in the past I would be prescribing more antibiotics, now because of the old PCT's* [Primary Care Trust] *guidance on trying to decrease antibiotic prescribing, those levels have fallen…"* (F6).

Similarly, a dentist described amoxicillin and paracetamol dose changes in children and then checking this with the MI Service;

> *"…if there's any changes in the doses, 'cause they've changed the amoxicillin for instance from 250-500* [mg]*, I'd double check that with them* [MI]*. Also, if it's the Children's Formulary* [BNF]*, the paediatric one, I would phone Medicines Information for any specific information about the dosage of paracetamol"* (F4).

Inevitably, clinicians are bound to have limitations in their clinical knowledge, as it is impossible for them to know everything there is to know, as highlighted by responses from clinicians interviewed in this study;

> *"I don't think anybody can be expected to know the answers to everything",* and *"I* […] *don't see how you can know everything about it* [all the medicines patients take]*, it's constantly changing …"* (F14 GP, F4 Dentist).

Typically, clinicians explained that they called MI for advice because they knew their own knowledge was out of date. They appeared to value MI advice as it gave them confidence in what they were doing, as this GP explained;

> *"I'll be asking them things I can't remember because I don't use it frequently enough and also I need the confidence to know what I'm doing is completely up to date and correct"* (T10).

Help from the MI Service was sought where MRQs arose because of infrequent prescribing of a medicine, as this GP described;

> *"so that might be a prescription request from secondary care, or from a patient that's come from abroad on medication that is less often prescribed here or is not prescribed here at all"* (F7).

Similarly, a dentist also highlighted unfamiliar medicines as a reason for using the MI Service;

> *"…when a new patient comes in — we get a list of their medication and if there's something that we're not familiar with then that would generally tend to be a trigger to, to look at getting in contact with the* [MI] *service just to see if there is any sort of dental implications"* (F11).

It was encouraging to see (and good practice) that clinicians recognised when they were not clinically up to date, and were aware of their limitations i.e. they knew they were not competent to answer a question. Although, it was observed that a few clinicians believed their knowledge was up to date;

> *"cause, I've not been qualified too long, it's only four years, so I'm like up to date with a lot of things"* (F1 Dentist).

While more recently qualified clinicians may feel their knowledge is current, this feeling of confidence about being up to date because of being recently qualified may be a fallacy (a type of bias) and could potentially be due to overconfidence in their own knowledge or unconscious incompetence (Croskerry and Nimmo, 2011; Bate *et al.*, 2012). Although, findings from this study suggest that that even when clinicians did their best to keep up to date, they still sought MI advice, especially for information that might be difficult to find, as this GP described;

> *"…just simple things you know that it's difficult to get, to gather evidence or things that are less common, and they haven't done the trials"* (F7).

Being up to date about medicines is challenging for generalist primary care clinicians who perhaps, compared to specialist clinicians, seldom know with what clinical condition the patient will present. Also with more patients having multiple morbidities, it is inevitable they will already be taking medicines, which makes selecting others all the more difficult. Primary care clinicians'

knowledge gaps were also exposed when dealing with complex and high risk medicines in clinical areas where they were not 'expert'. Unlike those who specialise in a clinical area e.g. cardiology, neurology, obstetrics or psychiatry, where there is a narrower field on which to focus ones' attention, many primary care clinicians need to know a little bit about everything. For example, choosing the safest antidepressant in a patient with epilepsy, or choice of treatment in pregnancy or breastfeeding;

> *"it's usually in pregnancy, you know where the data changes quite frequently, the database changes … antidepressants in pregnancy is another one I've used you for … use of antidepressants in epileptics is coming to mind now,, which was, you know the one with the lowest incidence of reducing the seizure threshold …"* (F3).

GPs need to be expert generalists (Reeve, 2015), and MI Services provide them with support by helping them manage their complex patients. Likewise, although the range of conditions dentists manage is less diverse than GPs, they do not know with what dental complaint the patient will present. Also problematic for dentists with knowledge of a narrow range of medicines, is that they provide an emergency dental service to unfamiliar patients, who can be on a huge list of medications for conditions they may know little about. One dentist explained they needed help with a dental emergency for a housebound patient as they were unfamiliar with their anticoagulation therapy and instigation of antibiotics;

> *"..the reason I contacted you was going on a domiciliary visit, so limited amount I could do, thought antibiotics might be needed,*[……] *was unsure when I'd looked in the BNF"* (F5) (Amoxicillin with acenocoumarol).

A major clinical knowledge gap was apparent for dentists around the time of this study, when a new oral anticoagulant medicine (dabigatran) was launched, as an alternative to warfarin. As a new medicine seen infrequently in primary care, dentists had limited clinical experience about how to manage the potential for increased bleeding risk with dental treatment e.g. tooth extractions or fillings. Difficulty and concern were expressed by several dentists who wanted a range of practical advice about adverse effects and interactions for this new medicine. They used MI because there was a lack of

clarity amongst clinical specialists about patient management and there was no national guidance available. A dentist described their uncertainty about this new medicine as;

> *"…. she'd not been on it* [dabigatran] *too long, and with it being a bit unpredictable,* […]*, so people don't really know how it's reacting, so I thought right…*" and asked MI (F9).

The same dentist was understandably worried, as a specialist had previously advised caution because of the risk of bleeding during dental surgical treatment;

> "...*my lack of knowledge …(*JR: Right*) … on the drug and the lack of perceived knowledge of it as well, you know amongst eh colleagues* […] *not long before that that I'd spoken to the Consultant in oral surgery and he had, he'd made it quite clear that, do not take one of these teeth out in the practice"* (F9).

In the last 10 years there have been some important clinical issues around the use of medicines in dentistry, with subsequent guidance issued. For example, changes to dental use of antibiotics to prevent infective endocarditis, (NICE, 2016); a safety issue about bisphosphonates causing necrosis of the jaw (MHRA, 2009); and managing the bleeding risks of dental treatment for those on new oral anticoagulants (SDCEP, 2015). However, the lag time between guidance issued and use in practice meant that dentists did seek MI Service advice to fill this information void, and thus update their knowledge.

The challenge for dentists knowing about new medicines and their relevance to dentistry is described by this dentist who explained how they struggled to keep up with their CPD about medicines, especially as available CPD training for dentists did not include medicines;

> *"…we do Continuing Professional Development, but not specifically on current medications,…*[…]*… bisphosphonates and these new anticoagulants in the last few years that I think have been a stumbling block to us or something that we've had to kind of learn on our feet as we go along. And obviously the change in em antibiotic prophylaxis as well and probably since I qualified they're the three that have been of big significance, that*

we've had to kinda sit back and start doing a bit of reviewing around it" (F9).

Managing patients on new medicines poses challenges for GPs too, not only because they are unfamiliar, but also because they are often initiated by specialists in secondary care, and there may be no SCG agreement in place. (East Lancashire Medicines Management Board, 2018). Exacerbating the difficulties of clinicians prescribing in primary care is that trial data on usage is not drawn from primary care patients, this means evidence is not aligned to the patient population seen in practice (Galbraith, Ward and Heneghan, 2017). This makes it more difficult to answer MRQs for these patients and thus provide person-centred evidence-based care and is where the MI Service is able to help.

Besides new or unfamiliar medicines proving a challenge for them, clinicians sometimes lacked medicines knowledge to be able to advise colleagues appropriately, or make a treatment choice in an unfamiliar situation. This GP had been asked by a practice nurse about switching a patient from one long acting prostate cancer medicine to another;

"I was asked to swap a patient from one [medicine] *to the other* […] *asked if there will be any problems and I didn't know the answer*" (T5 GP) (Switching from leuprorelin implant [Zoladex] to gosarelin injection [Prostap] for prostate cancer).

Another GP was unsure about use of an antifungal medicine in breastfeeding;

"…perhaps you don't deal with it all the time like I, you know I may have prescribed that six months ago, two years ago and then you're, you're pretty sure it's the right thing to do but because you've not being doing it all the time you've, you've forgotten or you've, you know, or you're not too sure," (F12 GP).

In both instances, contacting MI Services, when they realised they did not know the answer, was well founded, as based on the MI enquiry record, the answers to both of these questions were not easily found by the MI pharmacists.

The MI Service also provided support for clinicians when patients asked them something they had insufficient knowledge about. A well-informed patient questioned this GP about use of St John's wort with an antiepileptic medicine, which was being used for migraine;

> *"…then the wife said "'oh yeah, you talked to me before,' so they threw that question* [about St John's wort with topiramate] *onto me and I obviously didn't know the answer"* (F13).

This illustrates the importance of clinicians recognising their own knowledge limitations and understand the concept of conscious incompetence, which was exemplified by this GP who went on to say it was better to ask someone else, i.e. the MI Service, if they did not know the answer to a question they were asked;

> *"… we feel sort of like someone is there to help. I mean people often think of the GP sitting there, is an encyclopaedia of knowledge, but that is actually not true … … we've got limitations…"* (F13).

Clinicians interviewed were using MI advice to update their knowledge and support their CPD about medicines, with the advice they received being an opportune way for them to update their own knowledge; as this dentist explained;

> *"Generally with … with local anaesthetics, I mean when it, I mean when I go back to dental school 25 years ago you know, we were always told to avoid using adrenalin containing local anaesthetics with certain antidepressants and things like that, so…(JR:Yeah)… generally I have rung up previously just to find out what the current opinion was on that, because you know things do change over 25 years…"* (F11).

A GP said about advice regarding venlafaxine in pregnancy;

> "*plus points are I learn a lot, it empowers me and the patient to feel confident in what I'm doing*" (T10).

Moreover, use of MI advice in CPD for appraisal purposes was described by this GP;

> *"…at our appraisals we're always asked to show evidence* […]*, …so it's useful for the appraisal process…to be able to show"* copies of written MI advice (F14).

To summarise my findings about clinical knowledge issues, the MI Service plays a part in filling gaps in clinician knowledge when they have MRQs they are unable to answer. Sometimes it was apparent that clinicians did not have the embedded knowledge and experience about how to manage a particular clinical scenario because it was something they had not been asked about before, or that they dealt with infrequently, so contacted MI. Consequently, gaps in knowledge were instrumental to clinicians using the MI Service as a safety net. They can then use this to update their own knowledge and for CPD.

Technical knowledge issues: Clinicians also need the technical skills to be able to effectively and critically search online portals/websites and the wider literature so they can answer clinical questions themselves without referral to MI Services. However, it was apparent that clinicians contacted MI because of technical knowledge limitations. Some were unable to find the answer to their question because they did not know where to look; as these GPs describe;

> *"If you can't find it,* […] *but if we don't and it's not written information, something new comes across…(JR:Yeah)…I think at that stage we think we need some advice and…(JR: OK) …we'll get hold of you girls"* (F13).
>
> *"…you've got a prescribing question or query, something that's out of the ordinary, something that you just don't, can't access the information, it's somewhere else …"* (F14).

Yet even if they had access to appropriate resources, they were unable to search them properly; *"they're quite tricky to navigate sometimes*" (F1 Dentist) (About searching the British Dental Journal website and PubMed). They did try internet searches, but if this failed, utilised MI Services;

> *"…I will just use the, the Internet, em obviously you can, you can type it into Google obviously you can make a judgement whether it's a reputable site or not …(JR:Yeah)… and whether the information you're getting is, is*

good, em and then beyond that it would be often first port of call would be Medicines Management…" (In this instance the GP meant the MI Service) (F12).

This highlights that clinicians found searching for information to be challenging, finding it easier to ask someone else they could rely on, such as MI staff;

"…that's the quickest way you can get an answer off someone who's trained in that, to give, you know, that you can trust (JR: OK)… without going on a search engine." (F5 Dentist).

Of course, these research findings about technical knowledge only relate to those clinicians that understood their searching skills limitations, and who were aware they could ask the MI Service to help them answer their question due to greater technical ability. What is not known is how those clinicians that do not use the MI Service answer their MRQs. One presumes these clinicians feel sufficiently competent to look for information themselves, and are able to search specific websites and online databases correctly to find answers to their own MRQs. What is worrying, given the research evidence on clinician ability, is that they may do so but poorly. For example, it is possible that these clinicians are 'satisficing'; this happens if clinicians use the first piece of information they find even though it may not be the correct or the most up to date evidence (Bate *et al.*, 2012; Croskerry, 2013).

Information resource issues: For some MRQs, clinicians may know where to look and how to search various resources, but sometimes the resources themselves cause issues. For example, GP prescribing systems and CDSS play a major role in the provision of prescribing information and alerting clinicians to potential clinical problems, such as contraindications and medicine interactions. To help minimise the risk of using incorrect, inappropriate information, CDSS are linked to GP prescribing systems to help the busy, time-poor GP; although they do have their own limitations that can cause additional clinical uncertainty. This GP highlights how prescribing system alerts can be unhelpful;

"*when you actually …* (JR: prescribe something)*…try to prescribe erythromycin for someone or simvastatin….you know it* [the prescribing

system] *flags it up, I mean that* [erythromycin and simvastatin interaction] *I would know but there are others that are flagged up that I don't know the interactions"* (F14).

In other words, GPs used MI when their prescribing system and CDSS were unhelpful. This problem with CDSS has also been reported by other authors (Hayward *et al.*, 2013; Chana, 2015), as while these systems provide alerts, they do not provide practical advice about how best to manage the issue in an individual patient. This issue is further illustrated by another GP explaining how they contacted MI after their prescribing system flagged an unfamiliar interaction warning, stating that a medicine should not be prescribed and the BNF was also unclear;

"It might be where perhaps the computer's flashed up an interaction, and it's something I really want to give, and it's saying 'no', but it often says no …(JR: Computer says no) … computer says no, and then I check the BNF and it's sort of half-heartedly mentioned in there, or something in the same drug group, but not the specific drug that I want to give, and then I might phone you then and say what's the chances of this, what kind of interaction level is this, do I have to really worry about it?" (F15).

Information in first-line resources, such as the BNF, can be ambiguous as highlighted in the example above, or sometimes the information listed raises further concerns for the clinician about how to manage the patient, which was why they then contacted MI Services. Several clinicians sought MI advice due to a lack of clarity with information in the BNF itself;

"*the BNF wasn't clear whether it* [terbinafine cream] *could be used in neonates*" (T18 GP).

Another sought MI advice when BNF information about choice of antidepressant post myocardial infarction/CABG, was unhelpful;

"*the BNF* […] *that didn't help that much, so I think these are the people* [MI] *to help me*" (T15 GP).

Some dentists specifically highlighted that when the drug interaction information in the back of the BNF did not enable them to make a prescribing decision, they wanted someone else to tell them what to do;

"In the back of the BNF, like I sometimes think it's a bit vague, it's not very specific on that so, I think it's essentially easier probably quicker to phone and just get that sort of, get those checked out, any unusual ones" (F4).

"…sometimes the BNF, it just doesn't quite say the exact wording you want, even if it's just kind of a very similar drug, unless you, sometimes you just want someone to say 'yeah, 100%, that's right'…" (F5).

This is interesting as although the BNF is a key reference for clinicians, the content about interactions tends to be minimal, so it is no surprise that they expressed a tendency for calling MI Services. For example, based on my experience as an MI pharmacist, the use of pharmaceutical terms in the BNF can cause confusion regarding interactions, even for clinicians, by use of poor nomenclature, such as using the term relating to a class of medicines, such as 'macrolide' for erythromycin; or 'quinolone' instead of ciprofloxacin. This may cause further uncertainty for some clinicians e.g. dentists with limited medicines training.

To help clinicians answer their MRQs about interactions, MI Services have access to some subscription-based resources, usually unavailable to primary care clinicians, for example Stockley's Drug Interactions® and Micromedex DrugDex®. These provide much more in-depth information through details of case reports, mechanism of the interaction if known and associated practical advice. These additional resources enable MI staff to give clinicians more evidence-based, person-centred advice. This was seen on a number of occasions, including advice being sought for herbal medicine interaction information, as described by this GP;

"...questions around herbal remedies or natural remedies or things that maybe I wouldn't be able to find in the BNF, or interactions with those sort of things..." (F7).

The GP, quite rightly, identifies that unfortunately the BNF is not helpful for answering questions about interactions with complementary medicines. This poses a dilemma for clinicians who really have nowhere else to look, other than perhaps a Google search, which obviously calls in to question the veracity of such internet sources on retrieved information.

Further content limitations of available resources were seen when clinicians tried to use the BNF to answer questions involving patients on multiple medicines with renal impairment. Necessarily, the BNF only contains basic information about prescribing in renal impairment and more detailed specialist resources are lacking in primary care. This GP needed to prescribe gabapentin for chronic pain, so called MI for advice; as the extract highlights;

> *"….the BNF clearly states that you shouldn't increase the dose of gabapentin beyond 900mg when the eGFR is, I think it was less than 45*…(JR:Yeah) *I can't remember, that's what the BNF states, but actually when you ask, when I asked* [name of the MI pharmacist] *and she got all this additional evidence from other people, some of it anecdotal from the renal unit"* (F15).

As such, even though the BNF does include some information to help clinicians answer questions about complex patients, the content is limited to very brief advice without any context, making the BNF less useful for answering these questions. Thus, there is a tendency for the BNF to state that the medicine should not be used or that data are limited, which is not necessarily helpful to clinicians.

It was also apparent during interviews that some clinicians had a tendency for using the hard copy BNF, so they would check with the MI Service when they thought it to be out of date;

> *"like I say I think because of the, the nature of the BNF and it's annual, you know you don't know if it's, it's never going to be up to date, it's always going to be out of date you know a couple of months after it's published, isn't it?"* (F9 Dentist).

Although the BNF is an invaluable core resource containing key information about medicines and is the 'gold standard' medicines reference for clinicians in the UK, it cannot be comprehensive. However, the online version has regular updates and is more current than the bi-annually published paper copy. Yet it is a concern that they may use out of date information, if they do not refer to the online version, or use alternative resources available to them such as the eMC and NICE Evidence Search, or MI Services.

The eMC is a digital resource providing Summaries of Product Characteristics and Patient Information Leaflets for licensed UK medicines (OTC and Prescription Only). It is a valuable resource listing all the key information about the medicine from clinical trials and post marketing data collated by the pharmaceutical companies, such as interactions with other medicines and foods, contraindications and adverse effects. Still, this research did not highlight accounts of eMC use by clinicians interviewed, possibly because of a lack of awareness, or because it is not easy to search e.g. for an interaction and the risk is the user may miss or misunderstand information, so it is quicker to ask MI. Content from both the BNF and eMC is accessible via the NICE Evidence Search portal (NICE, 2019) and has the potential to be a highly useful resource, as it acts as a 'one-stop shop' for clinicians. This website combines evidence on health, drugs and technologies, public health, social care, and health care management and commissioning in one place, including guidance, systematic reviews, evidence summaries and patient information, but again no clinician mentioned knowing about or using this resource.

Additionally, clinicians can also use clinical guidelines to manage their patients. However, most guidelines are usually about treatment of an individual clinical condition and do not consider the practicalities of treating patients with multiple morbidities, where one medicine may exacerbate another clinical condition or interact with other medicines. In this study, clinicians wanted MI advice for their complex cases as their management did not 'fit' the guideline, given the patient's clinical situation and personal circumstances, as these GPs described;

> *"…I don't suppose there'll be NICE Guidance to cover those awkward situations when I phone you, that's probably where you come in …"* (F3).

> *"....if you want information on how to treat something that's out there and quite easily accessible through the guidelines, but when you're trying to weigh up risk, you know, whether that be your, you know, using an unlicensed medication, or ore tailored, doesn't it?* […] *it's that, it's prescribing out of guidelines, that, you need to speak to …* […] *what I'm talking about, about the sort of looking at your guidelines and the situation and blending them together and coming up with the right solution"* (F15).

When they needed help to consider the options and disregard guidelines to manage a complex patient they sought MI advice. Here, a GP needed to control pain in an older patient, already on multiple treatments with renal impairment, as noted in the following interview extract;

> *"… she couldn't tolerate tricyclics at all, so upping her Gabapentin was a good option really, and I just decided to ring the drug information pharmacist and see how much of a risk I was taking, because I am of that generation of doctors that the guidelines are there, but at, I think sometimes now we do tend to have this 'perfect' approach to prescribing […] but it leaves the patient struggling, and I am prepared to talk to people I know about the risks we're taking with different sorts of medication, and if it seems reasonable slightly step outside…"* (F15).

This use of MI Services, when patients do not fit guidelines, seems appropriate as MI are ideally placed to help clinicians manage their complex cases where conflicting treatment dilemmas exist that require medicines optimisation. Besides Health LIS, there is no other freely available service in the UK able to provide this level of medicines support and advice to primary care clinicians.

Under the theme of Information Resource Issues, clinicians also have the option of using a human resource i.e. asking another person, as well as digital information. For this they have several options, including discussion within their immediate 'community of practice' i.e. other dentists or GPs within their practice or local community, who may have come across a similar problem; clinical pharmacists based in the practice or CCG, or community pharmacists. They can also ask specialist clinicians in a secondary or tertiary care setting. Other choices include, asking a clinical librarian, pharmaceutical company or as in this study, the MI Service. For some clinicians interviewed, MI was being used as a last resort after asking colleagues. Initially they would discuss a medicines question with their colleagues and were more likely to seek MI advice if they too were also unsure of the answer, as explained by this dentist;

> *"…, maybe you would discuss it with a colleague, the other way round, do that first and if everyone's unsure then it's probably time to call"* (F5).

Although clinicians can ask pharmacists MRQs, findings from my research show that clinicians appeared not to trust the ability of a variety of non-MI

pharmacists, or thought they did not have the time to help them. Community and practice pharmacists are an obvious choice to field some medicines questions, however clinicians in this study had reservations about using them. This may be historical, in that pharmacists in primary care have had restricted access to resources and limited training in handling complex MRQs, i.e. about those patients with multiple medicines and conditions. GPs in particular, explained that while they could use their local practice or community pharmacist, they had concerns about their level of knowledge, ability and their willingness to help. For example, this GP was referred to the MI Service by the practice pharmacist for a complex case about choice of treatment for neuralgia in a patient with epilepsy and renal impairment;

> "*I spoke to our pharmacist here* [practice pharmacist]*, regarding the combination of the two and lowering the seizure threshold for amitriptyline and phenytoin. He said coming up the same on his computer and he advised me to phone yourselves"* (T20 GP).

It is reasonable, however, that the pharmacist decided to defer to the MI Service as this was about managing a complex patient which involved checking for interactions, considering possible adverse effects and choosing the most appropriate medicine.

Another GP described a community pharmacist as checking the BNF, but not doing much more than the GP had already done;

> "*Done that before and not always that helpful* [contacted the community pharmacist] – *tell you what they know and look in the BNF which you've already done and won't go any further"* (T35).

Additionally, they described difficulty contacting busy practice pharmacists;

> *"…I don't tend to contact them for these sorts of queries* […]*, but just because I feel like, you know, you won't always get through to them (JR: No) they've got other calls on their time"* (F14 GP) (relating to simvastatin in early pregnancy).

GPs were also uncertain about the level of clinical experience of pharmacists based in their practice and this affected their confidence in getting a response, so they did not feel they could ask them for help;

> *"…it depends, at one time there are one or two pharmacists, it's quite a big pharmacy here, sometimes as well and obviously it depends [on] their clinical experience as well, what background they've got, what clinical confidence they've got, so sometimes we do get an answer, other times we don't…"* (F13).

Community pharmacists are, like GPs and dentists, time poor to take on other activities as they are busy checking prescriptions, counselling patients, conducting medicines use reviews and advising on treatment of minor ailments. This premise is supported as MI Services do receive MRQs from practice and community pharmacists, as they too have the same constraints for handling difficult MRQs or in complex cases, as GPs and dentists. This may go some way to explaining why GPs held negative opinions about using them for MRQs. However, this situation may change with the development of pharmacists working in primary care, including clinical pharmacists in GP practices and nursing homes (NHS England, 2015), as they receive further training on searching medicines resources and answering MRQs (CPPE, 2019).

Primary care clinicians can also contact secondary care staff and pharmacists in this sector were an option, although some clinicians expressed a reluctance to speak with them due to prior poor experience, and so tended to discount them as viable;

> *"… pharmaceutical people, wherever pharmacists are not, to get them is hard…(JR: OK)… it's difficult to access them and then they're not there or they're on wards…(JR: Yeah)… it's a nuisance and they have to ring you back…"* (F8 GP).

Alternatively, a specialist clinician can be contacted, but as in this thesis, see 'Providing a decision', and based on published evidence, they may be difficult to contact, slow in responding and less inclined to provide person-centred advice (Baird *et al.*, 2016).

Besides other clinicians or MI Services, another possibility is to ask a clinical librarian based in a Health LIS. Clinical librarians are skilled in searching the literature (Brettle *et al.*, 2011; Davies, 2011; Perrier *et al.*, 2014), but dependent on their background, may be less well-placed to interpret findings

and provide medicines optimisation to individual patients. Use of Health LIS was not specifically mentioned by clinicians interviewed.

Risk and medico-legal back-up: Clinicians also used MI as a safety net when they had concerns about risk and wanted medico-legal back-up. Some of those interviewed valued the fact that MI advice was recorded on a database, which could be used as evidence, should they need it in the future;

> *"It's one of the big advantages as well, I mean as you would know with the current atmosphere and the way the litigation side of things as well."……"…. that I've spoken to Medicines Information advice line and been advised to do this, this, this …*(JR: M-mmm)… *so it becomes for audit purposes as well, for clinical awareness purposes that we do know who we're taking advice from"* (F13 GP).

On the subject of using MI as back-up, another GP said;

> *"…I feel I've been following good advice that you know if, even if something did go wrong we can say faithfully that we're following best practice, and medico/legally, I know you guys are logging things at your end"* (F6).

Most clinicians in the UK use a digital patient record system e.g. EMIS Health® and SystmOne®, to keep notes of patient consultations and can also record other interventions in the patient's (electronic) health record. Clinicians also explained that they made a note of their communication with the MI Service in the patient notes, indicating that they keep a record to corroborate their prescribing. When specifically asked in the telephone interviews, clinicians said they documented MI advice in the patient's notes in all cases except one. Some clinicians interviewed also added a copy of the MI email response to the patient's health record, and looked for a referenced written reply, as this enabled them to verify and reassure themselves about the reliability of the information provided;

> *"..think it* [written reply] *was better because you can, you can check the reference on the article as well, and check how it was based and how it was done, if it's credible or not"* (F10 Dentist). This GP valued the fact that the MI email "*usually comes back with a bank of evidence and*

references if you wanted to, you know chase it up and look into it more deeply" (F3).

To help protect themselves against negligence claims, clinicians subscribe to indemnity insurance, through the Medical Protection Society/Medical Defence Union for GPs, and the Dental Protection Society for dentists. This experienced overseas dentist, more recently working in the UK, mentioned getting MI advice as well as asking their indemnity provider, to help minimise risk should they have any negligence claims made against them;

"…it is important to have the reference, isn't it, it is, 'cause they say in the Dental Protection Agency if it is not written, it's not given so you always write any conversation"....."*I think when, I think when they* [medicines questions] *come about it's always just for, to see if somebody else have a different information that you're not aware, and then you can take better decisions, and sometimes we'll do the Medical Protection as well"* (F10).

As a society we have become more aware about litigation and lawyers actively encourage us to make claims against others when things go wrong (Schepers S, 2017). Clinicians voiced the issue of being sued and were minimising the risks to themselves by not relying on their own ability, their prescribing systems, other people or other information sources, as this dentist explained;

"I thought I'd check …(JR: … yeah)… just to be safe, so it's just probably covering my own back as well [……]… *and you don't want to do anything that you could get sued for, or in trouble for …"* (F5).

Clinical practice is inevitably prone to litigation as evidence-based practice consists of three components which include, balancing the best available evidence, clinical expertise, and patient values and preferences (Sackett *et al.*, 1996). Full-time doctors and dentists can expect to receive two clinical negligence claims during the course of their career (Dental Protection, 2017; Medical Protection Society, 2018). Of course nothing in life is risk free, we all take calculated risks every day e.g. driving a car or crossing the road. Similarly, no aspect of medical or dental care is risk free and it is the job of clinicians to take measured risks. In this study, clinicians did not want to rely on their own decision-making and, in some cases used MI as they preferred to

get a second opinion. Clinicians said they sought MI advice to help them weigh up the risks for difficult cases,

> *"…I suppose I wasn't, I wasn't, I wasn't trying to minimise I was more trying to establish the risk really…"* (F12 GP).

This dentist was understandably risk averse when a specialist had previously highlighted the lack of data about bleeding risk in dental patients with a new oral anticoagulant medicine and wanted back-up from the MI Service;

> *"…I'd spoken to the Consultant in oral surgery and he had, he'd made it quite clear that, do not take one of these teeth out in the practice…*[.....]*…you must send them in, because he'd had 50/50, some were fine, others were really big bleeds and he said it's just so unpredictable, so I just thought from a, from a point of view of prescribing as well, I wanted to be safe"* (F9).

The dilemma of managing risk in a complex patient with CKD was described by this GP, as they were running out of options to treat the patient's neuropathic pain. As guidelines were not relevant, they needed to weigh up the risk versus the benefits and found it helpful to discuss options with the MI pharmacist;

> *"…I just decided to ring the drug information pharmacist and see how much of a risk I was taking…"* (F15).

They also wanted back-up from MI as they needed to prescribe higher doses of medicines than listed in the BNF or eMC; as is described here;

> *"…it's still my responsibility if I write the prescription.* […] *because I was worried about the consequences, or increasing it anyway, but probably being a little bit more anxious about it, because these aren't easy decisions to make…"* (F15).

Problems with use of general reference sources for high risk questions were also an issue highlighted by some as a risk-related reason for consulting the MI Service. For example, the BNF only has limited information about use of medicines in pregnancy, as this GP relayed;

"…the information in the BNF is not always that extensive I think, yeah, to minimise the risk to yourself as a professional it's about getting other sources of information…" (Simvastatin in pregnancy) (F14).

Another GP was unsure because the BNF advised caution when using an antifungal in breastfeeding;

"I'd seen the, there was a little section saying about the, the age of the child and, and, and em advising a caution that's, that's when I sort of thought well perhaps I better just ask some advice before I prescribe" (F12).

Prescribing analgesia, other than paracetamol, in pregnancy was also a concern, especially as the BNF information was alarming;

"I had seen codeine prescribed in pregnancy floating around, I know they would give pethidine in the end stage of pregnancy and things like that, but you know the BNF, if you look at it, it just talks about decreased neonatal movements and things like that, and you're thinking you know, that sounds a bit scary to me, I don't think I'd want to suppress anyone's respiratory … (JR: No)… centre in the baby, and obviously they're more sensitive to medications than adults, so I always veer away from prescribing" (F6 GP).

When a patient wanted to continue an antidepressant that they felt was effective after they found they were pregnant, concerns about managing this case were given by this GP as a reason for contacting MI;

"Usually, you know the patient's already pregnant and is on an antidepressant and you're worried that it might not be safe and the patient doesn't want to stop, and it's sort of then trying to gather together some evidence…" (F3).

Clinicians even described that if they didn't get MI advice, they would avoid prescribing some medicines;

"I'd err on the side of caution, I'd just, you know I wouldn't, if I wasn't 100% on something I'd just not do it rather than take the gamble" (F5 Dentist).

This practise was also expressed by a GP;

> *"I would have probably just given her paracetamol and said just stick with that, that's as far as I would have gone.* […] *"I've seen many women and I've always advised them, look, you know things aren't safe, best just to stick to paracetamol, hot water bottle, and then just, you know let nature take its course"* (F6).

This tendency to do little or nothing in a more litigious society is unsurprising with clinicians becoming more risk averse (Medical Protection Society, 2018; Dental Protection, 2018). It has been found that those subjected to clinical negligence claims may subsequently practise more defensively; for example by ordering more tests than necessary (O'Dowd, 2015). Although it was not clear if any clinicians interviewed in my study had been subjected to these types of claims, this type of practice is concerning as a patient may be denied potentially helpful treatment and possibly have inadequately managed symptoms.

Conversely, an experienced GP, qualified for many years, talked about feeling that they should be more risk averse in their practice, as the working climate was different compared to when they first qualified;

> *"…really you can't do that now* [prescribe outside guidelines]*,* […..], *so a little bit of science behind supporting the decision you're making is actually helpful"* (F15).

They also found it frustrating that their younger colleagues were more risk averse than they were, and felt they should behave in the same way;

> *"…I work with a lot of younger doctors and we, we actually have a study group…*(JR: OK, yeah)…*but if you read any of their notes, it's all "guidelines say can't prescribe"* (F15).

This GP felt that their younger colleagues would benefit from using the MI Service for support and explained how a younger GP had referred a patient to them about prescribing antidepressants in liver disease because the guidelines said;

> "*…you can't use antidepressants in liver disease …well, you can* […] *and explain what the difficulties are, but this younger doctor didn't feel comfortable doing that…"* (F15).

Ideally, GPs as expert generalists, should practise person-centred care rather than protocol driven care, although this is a skill that comes with experience and training (Reeve *et al.*, 2013; Reeve, 2015). The role of the expert generalist clinician is to be flexible about guidelines if they do not fit what the patient needs and/or wants, but potentially leaves the clinician open to criticism, unless they can back up their decision. Complex cases carry greater risk as there are more confounding and competing variables to weigh up, with clinicians trying to use interpretive practice rather than protocol driven care. Risks can be managed by discussion of complex cases with the wider clinical team, to gather their knowledge and perspective about the clinical problem, and also with the patient themselves. In this study, the MI Service was able to help clinicians practise patient-centred care whilst minimising risk as by using MI to allay any concerns, clinicians felt able to prescribe appropriately and safely, backed-up by the fact they are using an expert service.

To summarise these findings about clinicians using MI advice as a safety net for knowledge and/or resource issues, as well as risk and/or medico-legal concerns. Interview extracts describe how they used it to fill in the gaps in their clinical knowledge, but also when they lacked technical ability, or there was insufficient information from those resources consulted, and if they had concerns about risk to themselves over perceived litigation possibilities.

This use of the MI Service as a safety net was apparent when clinicians moved from their usual decision-making processes to making decisions that exceeded their competency boundaries. Despite doing CPD, they knew it was impossible to keep up to date about everything, especially when unfamiliar medicines were initiated by specialist clinicians in the hospital sector. This is compounded by the fact that there is too much information to access, which is also constantly changing. Clinicians used MI advice to fill in gaps in their knowledge and to update their knowledge for future use.

Although some clinicians tried to find the answer themselves, especially for simpler questions; others described difficulties when their prescribing system flagged a problem, particularly if the answer was not in their usual reference sources, like the BNF; or if it was in the BNF, the information they found was unclear, insufficient or worrying. These problems were particularly apparent for challenging questions for which they did not know where to find the answer, including those complex or high-risk cases less likely to be covered in a clinical guideline. When the clinician was unable to use their own knowledge, resources, or their wider 'community of practice' to answer a MRQ, tapping into human resources was an option and previous positive use of MI meant that clinicians would often use MI Services preferentially.

Past poor experiences utilising pharmacists, and slow replies from secondary care clinicians also resulted in them using MI Services. In some instances, prescribing clinicians were unsure of the ability of some pharmacists to be able to answer the more complex, high risk questions and if they could, whether they would have the time.

Finally, clinicians also contacted MI when they wanted back-up and support to minimise risk to themselves and their patient care. They valued the fact that the MI Service sometimes provided a written, referenced response which they could keep with the patient's medical notes. Also they appreciated the fact that the MI Service kept a record of their enquiry and the advice provided, should they need to provide evidence for possible medical negligence claims in the future.

In the next section I will describe and discuss how clinicians used the MI Service as a medicines 'help desk'.

Medicines Information as a medicines 'help desk'

The relevant themes extracted from Table 4.1 are in Table 4.5 below.

Table 4.5 Domains, meta-themes and themes for Medicines Information as a 'help desk'

Domain of Medicines Information influence	Meta-theme	Theme
The motivating factors for clinicians deciding to seek Medicines Information advice	**Medicines 'help desk'**	**Expert service**
		Trusted service
		Convenience

A 'help desk' or 'customer service centre' is a central point that people can contact when they have something they need support about. They are particularly well known in the IT setting as a resource people use when they need technical support. Similarly, 'call centres' or 'contact centres' are provided by organisations to support customers or service users. In the NHS, 111 (formerly NHS Direct) is a dedicated public contact centre for urgent medical concerns in England and Scotland (NHS 111, 2019) yet there is no nationally recognised contact centre for NHS clinicians with MRQs.
Clinicians interviewed used a variety of expressions related to them viewing the MI Service as a medicines 'help desk' or 'contact centre', with expressions such as;

> *"…it's more like a live help desk sort of a situation thing, where somebody is sitting just ring them and they'll look into it straightaway and get back in to us"* (F13 GP)."

Others expressed this as being able to go directly to someone that could help; particularly when the person at the end of the phone could use their database to access a similar MRQ;

> *"It was really nice going one route and very quickly getting a definite decision"* (T36 GP).

> *"It was very helpful practical advice, they'd* [MI] *had a similar query recently and they'd already looked up a lot of the information and it seemed that the advice was that it* (sodium cromoglicate eye drops) *was safe in neonates"* (T8 GP).

Nowadays, most commercial organisations have contact centres and within these, as well as the traditional method of telephone contact, they have increasingly been expanding their use of multichannel technologies, such as online FAQs, Facebook, Twitter and live webchat to provide customer service, while reducing costs and ensuring accessibility. They do this by providing customers with digital self-service options first e.g. online FAQs, moving towards 'live assistance' if the user cannot find an answer. This type of service provision is something the MI Service does in a small way via FAQs, although this requires further development to be more intuitive, interactive and user-friendly. However, human contact was highly desired by interviewees in this study; clinicians valued and preferred to speak to a person;

> *"you know I* [..] *just, I want to pick up the phone and speak to somebody…"* (F8 GP);
>
> *"…sometimes you want to hear someone at the other end of the line say 'actually, I've had a look and there's nothing' "* (F9 Dentist);
>
> *"My perception is that you phone, give the query, if it's a straightforward answer that you can give over the phone then you give the answer at the time"* (F14 GP).

The findings in this study about clinician preference for human contact, align with the fact that despite the increasing use of digital options in commercial organisations, customers still want 'live assistance', to experience the human connection, and prefer to speak to a technical expert for more difficult problems (Call Centre Helper, 2017). Although perhaps, as practising clinicians become more familiar with various clinical/medical digital platforms at undergraduate level and their use becomes embedded into practice, preference to speak to the MI Service may change in the long term. While it is inevitable that those call handlers in centres who follow strict algorithms are likely to be replaced with digital options, until artificial intelligence is able to handle complex problems, contact centres will need people to answer more difficult customer questions, either by telephone or other digital media, such as web chat (Call Centre Helper, 2017). Similarly, it is unlikely that digital platforms will completely replace speaking to a person, MI Services will still be

required for MRQs involving complex cases, which are only going to increase. Although, as those with more digital experience filter into practice, the challenge for MI Services will be to develop digital platforms, to allow users to answer their own MRQs if they prefer. The main themes identified within this medicines helpdesk meta-theme with regard to clinicians using the MI Service as a medicines 'help desk' were around provision of an expert, trusted service and convenience, these are described and discussed next.

Expert service: Clinicians described how they perceived MI advice as provided by an expert, specialist qualified service able to check the appropriate resources;

> *"…it's* [advice is] *only as good as the person on the end of the phone, isn't it, they* [other clinicians] *don't have the access to the databases that you have, where you are"* (F3 GP).

A similar view was expressed by this GP;

> *"so the information we've got is from a qualified pharmacist who are looking into the appropriate website and databases. I think for me personally that, that gives me a lot more confidence"* (F13).

They also wanted detailed pharmaceutical advice, which they felt could only be provided by a specialist service like MI, rather than from another specialist clinician;

> "Y*ou can go to a clinician but they won't really, they know about handling the drug in everyday work which is very useful but you want to know something specifically about this drug, does the drug company say this or that, what does the pharmacopoeia say, if psychiatric drug or neurological drug and go to Maudsley* [psychiatry] *Guidelines and they* [MI] *have access to so much, think they are a fantastic service*" (T15 GP) (Choice of antidepressant post myocardial infarction/CABG).

In fact, the specific, practical nature of information provided by an MI expert was valued by this GP;

> *"…it was very, you know, good detailed information about how to prescribe and how long for"* (Recurrent vaginal thrush in pregnancy) (F3).

These findings support the MI remit where services are provided by 'expert' pharmacists, who use their critical thinking skills to clarify the MRQ with the clinician in order to obtain as much relevant patient and clinical information as possible. Additionally, staff have training and experience of searching evidence-based medical and pharmaceutical resources, and the wider medical literature; ultimately providing a person-centred evidence-based response, by using their MI skills and pharmacy knowledge to interpret the information.

Trusted service: For people to become repeat users of a 'help desk', they need to be able to trust the advice provided. This trust was exemplified by the fact that many clinicians interviewed were repeat service users and agrees with the wealth of previously published MI studies with positive findings for user satisfaction. Their trust in MI was expressed as a specialist service, providing evidence-based advice they could rely on;

> "*I take their advice as being really the best advice I can get as a GP in the UK*" (T10);
>
> "*…we can never know as much as a service like yours is, so I think we kinda put that trust on you, that you're giving out evidence-based advice…"* (F9 Dentist);
>
> *"…whatever advice I will give them is going to be you know tried and trusted advice, 'cause it's been coming from a specialist service..."* (F6 GP).

Others thought that because MI staff were skilled in searching for and evaluating up to date, evidence-based information, this instilled in them confidence and trust;

> *"I always find that you know the, it's good current information that I receive, it's, it's information that I can be confident with to use* […]*, and take into practice with, without any, any worries at all, …*[…]*…I trust in your expertise…*[…]*…you guys know what you're doing…"* (F11 Dentist);
>
> *"…you're probably aware of a lot more websites and databases where you can get evidence-based first hand appropriate information there and then straightaway, so I think that that gives a lot of confidence to us as well, that this information which has come out is not just from Google or anything"* (F13 GP).

Convenience: A key feature of the ideal 'help desk' is that it should be convenient to use. For a service to be convenient for the end-user it needs to be accessible, ideally quicker than doing their own research and provided at an appropriate time i.e. a response provided according to the individual requirements of the customer. The accessibility and timeliness of the MI Service was described by clinicians as getting answers straight away;

"*somebody there to help me then and there"* (T21 GP);

".. the good thing about your service is that it's, you know it's easily accessible, and you can get an instant answer all the time" (F6 GP);

"*Every time I ring up I've just found the service really, really good, because it's really quick, and it's really clear"* (F1 Dentist).

Ideally, MI Services aim to provide responses at a time convenient for the clinician, as this GP states;

"*It's a very convenient way of getting up to date information most easily"* (T10).

The balance being that not every question is answered immediately, as responsiveness has to be weighed against clinical urgency, complexity of the question and enquiry service workload.

Clinicians also found the service convenient because they could pick up the telephone, speak to someone and get advice whilst the patient was waiting, meaning treatment for patients was not delayed, for example as this dentist described;

"…it's really easy accessible, you know I've em … many a time if something's arisen I've asked the patient to wait in the Waiting Room, I've just said "do you fancy sitting outside with a magazine for five minutes?," I've been on the phone, sorted it out, got them back in, all within the appointment" (F9 dentist).

The timely nature of MI advice was also valued by GPs as they too could quickly make decisions about patient treatment;

"I needed to know on that day. She was not well and we needed an answer fairly quickly" (Amoxicillin with methotrexate) (T22 GP);

"…this guy, I phoned you within quite a short time I could phone him [the patient] *back…(JR: OK) … … it's sorted…(JR: … yeah)… you know happy guy, doctor sorted…Imagine if I had to phone him back in 2 days' time"* (F8 GP).

Using the MI Service was viewed in some cases as more convenient than asking other people for advice. When clinicians were asked about alternative sources of information, they explained that if they asked a GP or specialist they might have to wait for a reply. They felt they got a quicker response and could treat the patient straight away, compared to contacting another clinician.

Ideally, busy clinicians do not want to wait for an answer to their more urgent treatment dilemmas and using MI avoided them having to contact another clinician. This dentist avoided having to ring the GP and wait for an answer;

"…you can deliver the [dental] *treatment that you need to in good time, there isn't any stalling* […..] *I think you can probably provide pain relief and something that's going to alleviate your* [the patient's] *symptoms quicker, you can deliver it faster when you've got that advice at your fingertips* […..] [the] *alternative would be to ring the GP…"* (F9).

Although they could ask someone else, clinicians also stated it was not always easy to know who to ask, and that it might be more difficult to get an answer from a specialist due to their availability and workload;

"…may be asking eh one of the, I don't know, specialists at the hospital it probably would be…(JR: M-mmm)…but em whether it would be someone at the breast clinic or one of the you know obstetricians, …[…]*…some consultants it, it depends,…[…]…when you've called them* […]*, it may be at a time when they're doing admin work it's quite easy, other times obviously they're busy…"* (F12 GP).

Fundamentally, by preferentially using the MI Service over hospital physicians, the service was invaluable for clinicians, and their patients, because it could be quicker than waiting for a patient referral to a specialist;

"is it safe to continue, or not, while you're waiting for their appointment to come up at psychiatry, you know through an antenatal clinic, which might be some weeks away …" (F3 GP).

Whilst speed of response was appreciated, sometimes this was seen as less of an issue for some clinicians, as their MRQ was non-urgent but complex, thus requiring a more detailed search. This GP thought it was understandable that it might take time to get a response;

"…quite often [the answer does not seem to be straightforward]*, so you go away and look at your resources, which I presume you're looking at the literature and then come back with the answer based on that…*[…]*…so I would have thought it's entirely reasonable and appropriate that there is a bit of a time delay whilst you look at the evidence …(JR: OK)… that you've got, you know literature that you've got,"* (F14 GP).

Other interviewees expressed convenience, not as getting an immediate answer, but as contacting the MI Service at a time convenient to them, such as prior to the patient's pre-arranged appointment, or after surgery hours when they have more time to telephone MI and discuss the MRQ;

"…it's generally been a case that, as in with the case of the guy with the extraction, you know it's something that we're planning to do in the future, so it gives me time to, to give you a ring and then get back to the patient after that…" (F11 Dentist);

"I don't tend to use the service while the patient is there, just because of time constraints during surgery, but I will ring after surgery and very quickly […..], *you know usually within a day I would get an answer, which is really helpful, I can feedback to the patient very quickly then"* (F7 GP).

Another element of convenience, as well as accessibility and timeliness, conveyed by clinicians, was saving them time. They did not have to spend time trying to find an answer themselves, as these clinicians described;

"...I've always found yourselves really helpful in answering those questions where it's, it would be more difficult, it would take me more time maybe to find out the information" (F7 GP);

…it's just more time-consuming really, I'd rather like ring yourselves, it's just a lot quicker, 'cause you seem to have like the evidence to-hand…" (F1 Dentist).

Particularly when the patient was taking multiple medicines;

"…because I think when you're confronted with 21 medications, unless you specifically know the interaction with all of them, or check it manually, which I think will take a really long time - 'cause I have done it before" (F4 Dentist);

"It is quite useful for me as well, it saved my time as well …(JR: Yeah)… of sending them away, then getting in contact with you people…" (F13 GP).

A recurring type of MRQ, mentioned as time consuming by several clinicians, was that of complementary therapies, which are very popular with patients (James, 2017). They needed to find answers to herbal medicine questions but were unsure about reputable information sources. This GP described contacting MI because of time constraints and a lack of easily accessible, reliable information sources about interactions with complementary medicines;

"…I've a, you know, lots of demands and I may not have been as quick to find out the information, and it's difficult to know what to trust …(JR: Yeah)… as well out there, because if you put anything, particularly about natural herbal remedies, there's unsubstantiated claims about lots of them, so to sift through that would be time-consuming, […..]*, but it wouldn't have been as easy for me…"* (F7 GP) (Barley grass powder with other medicines).

This difficulty of searching for answers to herbal medicine questions was expressed by another clinician. Whilst they believed they would have found the answer (St John's wort with topiramate), it would have taken them far too long and potentially left the patient without any treatment for their depression;

"I think somehow I could have still got the information…(JR: Yeah)… not necessarily sort of same day or next day, maybe within a week, that may have delayed or spent a bit more time for the patient to go and start the

medication, I think that's happened in the past before I started to use this service (F13 GP).

Whilst it might be safer for clinicians to encourage patients to avoid complementary therapies due to lack of efficacy or possible risks, the reality is this is not likely to happen, due to their popularity. This means that primary care clinicians need to make informed decisions about complementary therapies, but unfortunately the availability of accessible, reliable resources they can access to answer these questions is minimal. Although there are some UKMI Q&As, EMA monographs and Cochrane reviews, there is little else and it is debatable as to whether clinicians are even aware of such resources. Instead, they can contact MI Services, who subscribe to well-recognised resources e.g. the US produced Natural Medicines Database (Natural Medicines, 2019) and who have the skills to answer the more time-consuming, complex complementary therapy questions. That is, considering the interaction risk with their other medicines, as well as the effect on the patient's other conditions, by taking into account the pharmacology of the complementary medicine and possible liver enzyme effects (Schjott and Erdal, 2014; Gregory *et al.*, 2015; Day and Snowden, 2016).

A final element of convenience regarded time saved when the clinician did not have to send the patient away with an unanswered question, so could get on with other work without having to re-see or contact the patient, thus saving both themselves, and the patient, time; *"… you're not sending the patient away to then come back at a later date to do something, you, you can crack on and do it straightaway"* (F9 Dentist);

"I think that was quite good in that sense, it was done…(JR: Doing it at the time?) …there and then" (F13 GP).

Although other MI studies have documented MI Services as convenient by providing an accessible, timely service from a quality assurance perspective, they did not give any detail about how this was achieved (Melnyk, Shevchuk and Remillard, 2000; Schjøtt, Pomp and Gedde-Dahl, 2002; Hedegaard and Damkier, 2009). This study is the first study to describe how clinicians value the MI Service as a 'help desk' for their MRQs. They found it convenient as they could speak to someone and get up to date, evidence-based, immediate

telephone advice about medicines treatment, often whilst the patient was there, which avoided delays in treatment or them having to wait for a referral to a specialist clinician. For non-urgent, complex questions they knew they might have to wait but preferred to do this than wait for a hospital clinician to respond, especially if they did not know who to ask or if they would be free to discuss the problem. Timeliness was also about being able to contact MI at their own convenience, i.e. in advance of a patient consultation so they were prepared for discussion with the patient or after surgery hours when they had more time to discuss their MRQ with the MI Service.

While the study by Marrone previously described time savings that MI Services could make as PHS, this was more theoretical than actually documented (Marrone and Heck, 2000). My study is the first to describe how the MI Service saves clinician time by answering their MRQs whilst the patient was with them, as they did not have to send the patient away and either, call them back or book another consultation. The MI Service saved clinicians spending time trying to answer their difficult questions, especially those where resources are lacking, e.g. MRQs about complementary therapies, or for complex cases where they thought the information would be awkward to find, or take them longer to search for.

As this study found, the MI service acts as a 'help desk' because it is viewed as a trusted, convenient, expert service, although it is unfortunate that not all primary care clinicians know about MI Services in the UK (Rutter, J. and Rutter, 2004). This is a concern, as non-MI studies have found that GPs have to prioritise questions as best they can and do not answer them all (Del Fiol, Workman and Gorman, 2014), particularly as very little is known about what clinicians do to answer MRQs if they do not use the MI Service (Rutter, J. and Rutter, 2004). In my research the problem of not being able to answer their own MRQs at that moment in time was described by a GP as a reason for seeking MI advice;

> *"…sometimes it's just pressure of time to look it up and when am I going to be able to look that up and the moment's passed and I think am I going to be able to get that done?"* (T37 GP).

Prior to knowing about the MI Service, this GP explained how they would try to answer questions they had jotted down after surgery, as this was what other prescribers did in the practice;

> *"…a lot of queries do come in from day-to-day, and somehow we do get to the bottom of it and do find the answer of it,* […..], *some people write it down and that is part of the thing I used to do before as well,* […..] *we have, every GP has got their own sort of like small notebook, or, and we jot things down"* (F13 GP).

Once they knew about the MI Service, instead of doing what their colleagues did, this GP was able to contact MI directly with their more awkward questions, rather than answering themselves after surgery;

> "*At the end of the surgery they're looking through it* [the list of questions], *like any queries to do that they need to check, go back and do, take some more information or find out something, and that used to be part of that list for me as well* […..], *either ask a senior colleague, ask a local pharmacist, ask a friend, Google it, different portals …"* (F13 GP).

This illustrates how prior knowledge of the MI Service, enabled this GP to use MI for future MRQs, and is consistent with findings of the MI study where primary care clinicians did not use MI because they did not know about it (Rutter, J. and Rutter, 2004).

The time saving element of the MI Service being viewed as convenient is important. GPs and dentists are under increasing workload pressure and time constraints, as such various means of reducing pressure and saving GP time are being introduced (NHS England, Royal College of General Practitioners, and Health Education England, 2016; Baird *et al.*, 2016), including the development of the role of clinical pharmacists in primary care. Although these clinicians, including practice pharmacists, have access to websites and various CDSS, they too are also restricted by time and may not have sufficient skills to answer those difficult MRQs, certainly those involving complex patients. Therefore, clinicians accessing the MI Services saw it as a 'one-stop-shop' because it was accessible, convenient, and provided real-world advice. The varied awareness of the MI Service as a 'help-desk' is compounded by the MI Service not being formally publicised to primary care clinicians. Passive

promotion is achieved through centres listed in the inside front cover of the paper BNF, and furthermore, although some digital information is provided, via the SPS website, this has had limited formal publicity since its launch in August 2016.

To summarise my findings about clinician descriptions of use of the MI Service as a medicines 'help desk', it acted as such by providing trusted, expert, convenient advice. They used the service to provide person-centred, evidence-based advice, which sometimes required specialist resources they could not access. Clinicians interviewed found discussing the case via telephone invaluable, particularly if they got immediate advice whilst the patient was there. Finally, they found the MI Service convenient because as well as being accessible, it also saved them time. In fact, the immediacy of some of the advice potentially saved time for patients and clinicians alike, as there was no need to book a follow-up consultation to discuss the outcome of the MRQ.

Summary of this chapter

This study describes how clinicians used MI advice as a safety net in their decision-making, as well as the effects of advice on their prescribing and patient care, and effects on their feelings. They also used the service as a safety net when they had knowledge or information resource issues, and wanted risk and/or medico-legal back-up; and viewed the service as a medicines 'help desk'. These findings are summarised below.

Decision-making: Clinicians were using MI advice as a safety net for their decision-making, especially for complex or high risk cases and/or those where the answer was difficult to find. MI staff often told them what to do and then they acted on it, or it helped shape their thought processes so they were able to make a decision. The MI Service therefore plays a key role in clinician decision-making by taking over the difficult, time-consuming research and System 2 decision-making directly processes. They were also using MI advice to get a second opinion and to confirm what they were thinking.

Prescribing: Clinicians thought their prescribing was improved when they used MI advice to inform their prescribing for complex or high risk cases. Additionally, they used the MI Service for other challenging questions, which they found difficult to answer themselves, allowing them to make an immediate prescribing change for the patient. They also felt their prescribing was better and/or safer because they knew their prescribing was informed by reliable, trusted evidence. They also described how they used advice to update their own knowledge i.e. it helped improve their 'mindlines'. They are also able to integrate MI advice into their System 1 decision-making, illustrated by how they changed their prescribing practice and subsequently used it with future patients. Importantly, they also used patient-specific advice to review prescribing of similar patient groups within their practice, thus avoiding potential problems for other patients. Equally important, they also said they used MI advice not only for their own patients and CPD, but also shared it with their colleagues, that is their 'community of practice'

Patient care: MI advice was viewed as improving the clinician patient relationship, as well as reassuring or empowering patients and having a clinical effect. Clinicians thought it was better to be honest with patients when they did not know what to do, and explained to the patient that they were going to ask a specialist service for medicines advice. They thought patients seemed to appreciate this fact, and described how they were able to use MI advice in SDM discussions. They also felt their relationship with the patient was improved. Some felt that MI advice had a beneficial clinical effect on the patient, thus enabling continuity of care.

Clinician feelings: Clinicians were better informed, as such they described feeling reassured and even empowered by MI advice, to make improved prescribing decisions for their patients, or to question a decision by others whom they perceived as expert.

Knowledge or information resource issues, and risk and/or medico-legal concerns: Clinicians used the MI Service as a safety net to fill in the gaps in their clinical knowledge, but also when they had technical or information resource issues, or concerns about risk and wanted medico-legal back-up. Those interviewed knew it was impossible to keep up to date about

everything, especially when unfamiliar medicines were initiated by specialist clinicians in the hospital sector or there was too much information to access, and were using MI advice to update their knowledge for future use. When their prescribing system flagged a problem, the answer was not in the BNF, or if the information was unclear, insufficient or worrying, or for challenging questions for which they did not know where to find the answer, such as for those complex or high risk cases less likely to be covered in a guideline, they sought MI advice. This was sometimes in preference to others, due to previous positive use of the service. Finally, clinicians explained how they contacted MI when they wanted back-up and support to minimise risk to themselves and their patient. Additionally, they valued the fact that MI provided a response which they could incorporate into the patient record, refer to for future patients and for possible medical negligence claims in the future.

Medicines 'help desk': Clinicians in this study viewed the MI Service as 'help desk' because it provided them with trusted, expert, convenient person-centred evidence-based advice. They also valued 'human' contact and the immediacy of advice, as potentially saving time for patients and clinicians alike.

In the next chapter, I discuss my findings further by relating them to the models of decision-making and prescribing, that I introduced in Chapter 2.

Chapter 5 Overall discussion and conclusion

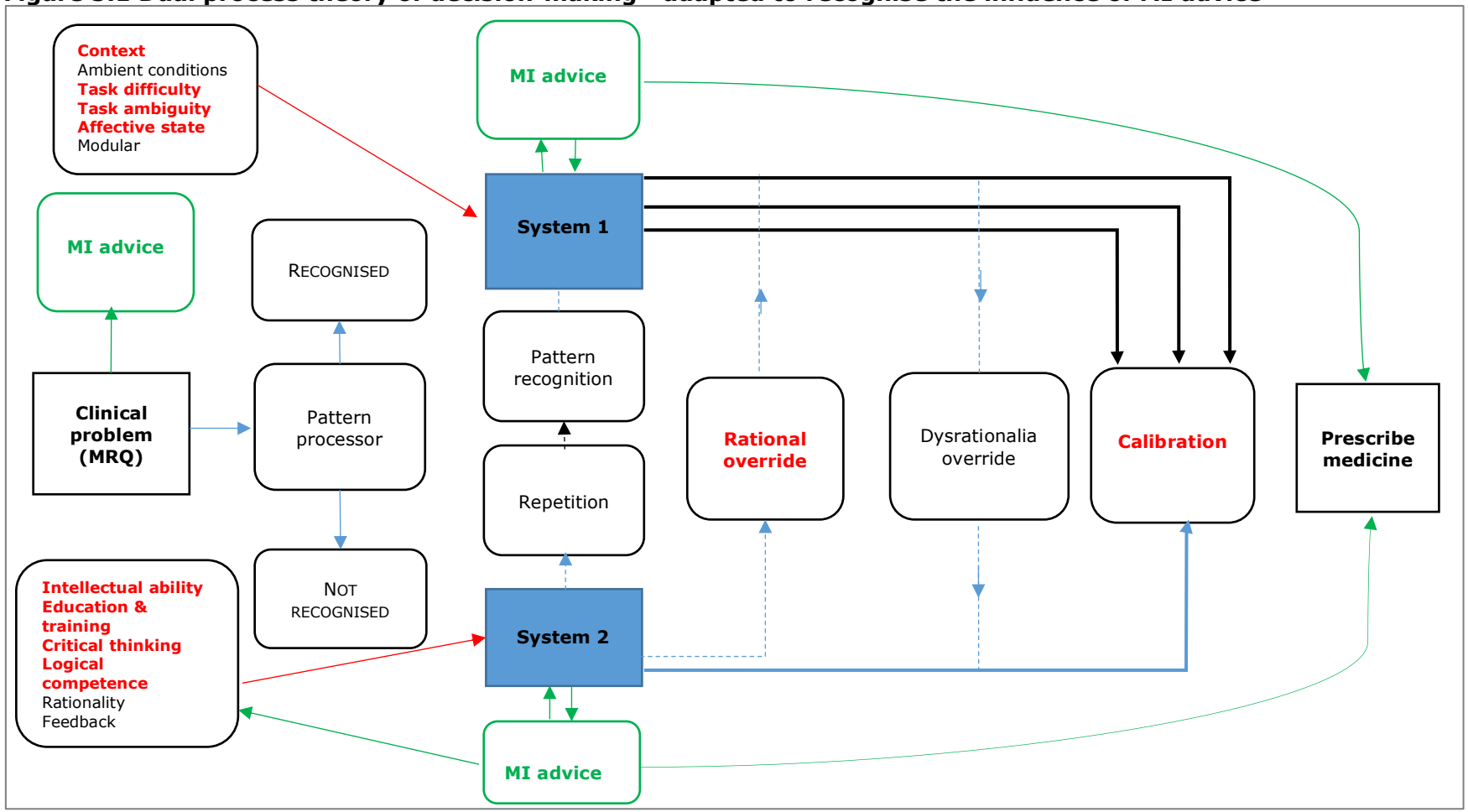
In the previous chapter, I described, discussed and summarised my findings, including those about how clinicians described their use of MI advice in their decision-making and prescribing. In this chapter, I expand on these findings by linking them with the decision-making and prescribing models I introduced in Chapter 2, and discuss the contribution these findings make to the MI Service, clinicians and the wider NHS, along with my overall conclusions and recommendations.

Clinician use of MI advice to make prescribing decisions

As already mentioned, clinical decision-making and prescribing are complex, multifactorial processes, and have been linked to the dual process theory of decision-making (Bate *et al.*, 2012). Figure 5.1 on the next page shows an adapted model of the dual process theory of decision-making, with boxes added in green to indicate where I think MI advice correlates with the dual process theory of decision-making; these are discussed below.

Findings from my study show how clinicians contacted MI when they were unable to use their usual decision-making processes; that is their System 1 decision-making processes for which they rely on their existing tacit knowledge, 'rules of thumb' or 'mindlines'. In other words, the MRQ was not recognised via their 'pattern processor', for example when they had unfamiliar, challenging, complex and/or high risk cases, and switched from being unconsciously competent to consciously incompetent, so wanted someone whom they perceived as 'more expert', to do their System 2 thinking for them. As Figure 5.1 shows, System 2 decision-making is not easy as it requires intellectual ability, education and training, critical thinking and logical processes, and while clinicians are capable of doing some or all of this, they do not necessarily have the time, skills or experience to do this for unfamiliar, complex and/or high risk cases. My findings show how that advice from MI either provided the clinician with a decision i.e. did their System 2 research and thinking for them, or helped them with their System 2 decision-making, and thus enabled them to make an informed decision so they could 'rationally override' System 2 i.e. use MI advice, and revert back to System 1 thinking.

Figure 5.1 Dual process theory of decision-making - adapted to recognise the influence of MI advice



Note: Green MI Advice boxes are additions to the original model and (GREEN arrows) show how these relate to it. All other text and arrows are in the original model, however text highlighted in RED (and RED arrows) indicates where MI advice contributes to the model.

Also, as shown in Figure 5.1, clinicians described how they used the MI Service as they wanted advice to check their thinking was correct i.e. they wanted to 'calibrate' their System 1, by using the MI Service as a safety net to confirm a decision and then felt reassured, or even empowered, to prescribe safely. The green 'MI advice' boxes have been added to indicate where MI advice fits in this model. Original text and arrows from the model has been changed to red to indicate the influence of MI advice. Sometimes they used MI for an MRQ because of prior past experience of asking MI, which is why I have added a box directly above the one that starts with 'Clinical problem (MRQ)', to show how sometimes they sought MI advice without doing anything first. Furthermore, the box and text in red on this decision-making model referring to '*context'*, '*task difficulty, task ambiguity* and *'affective state'* correlate with my findings where they viewed the MI Service as a medicines 'help desk' they trusted, which was able to provide convenient, expert advice.

Additionally, findings about clinician use of MI advice for future patients explain how they incorporated their new knowledge and advice into their System 1 decision-making process, so they knew what to do subsequently i.e. informed their 'pattern recognition', thereby minimising their need to use their more time consuming System 2 processes for similar future problems. MI advice was able to help improve their knowledge base so they became consciously, then potentially unconsciously competent, once the MI advice had been embedded in their System 1 processing. Finally, the box and text in red on this decision-making model referring to skills required for System 2 decision-making, '*intellectual ability', 'education & training', 'critical thinking' and 'logical competence',* correlate with my findings around clinicians seeking MI advice as support for System 2 decision-making.

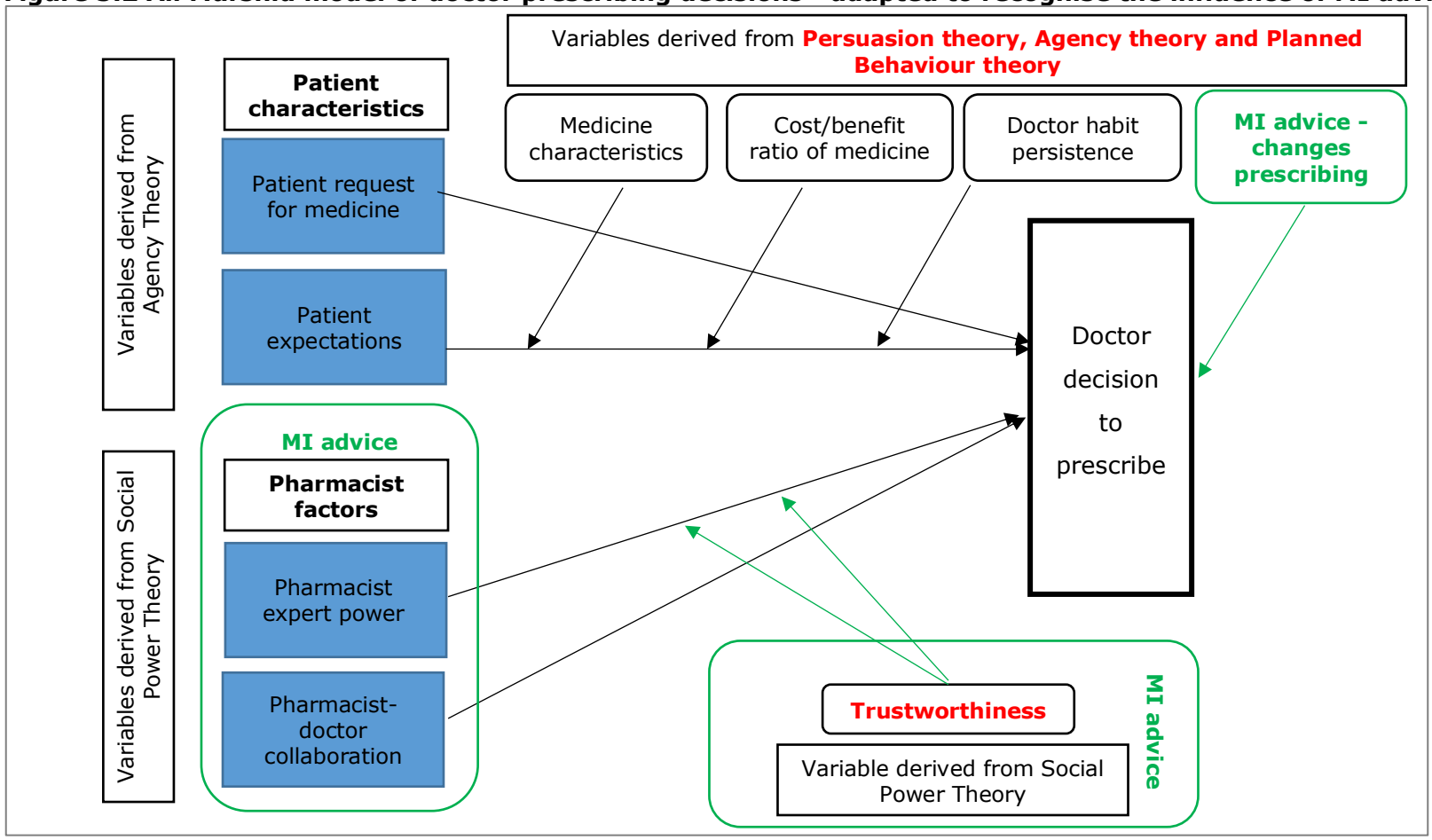
Next, I want to discuss the model of doctor prescribing decisions, proposed by Ali Murshid *et al*, that I introduced in Chapter 2 of this thesis (Ali Murshid and Mohaidin, 2017). Figure 5.2 shows this theoretical model, and I have added the green 'MI advice' boxes to indicate, based on my findings, where MI advice fits in this model and the influence of MI advice. All other text and arrows were in the original model. This model proposed that several pharmacist factors, derived from Social Power theory, were relevant to doctors making decisions to prescribe medicines. These were about the pharmacist having

expert power and pharmacist-doctor collaboration, with trustworthiness being an additional factor. Conversely, my findings also help support the pharmacist elements that were proposed by the authors of this model, that is, of the pharmacist providing expert power and trustworthiness. The pharmacist elements align with the findings of my study, in that prescribing clinicians described how they valued the MI Service as a 'help desk' because they felt it was a trusted service, provided by expert pharmacists.

As well as the MI Service influencing prescribers on the premise of Social Power theory, I propose that findings about clinician use of the MI Service can also be linked to Persuasion theory, Agency theory and Buyer Behaviour Stimulus Response theory. By enabling clinicians to change their prescribing for an individual, and then subsequent patients, this indicates MI as having a role in Persuasion theory, where the sender of information (MI) modifies the behaviour of the receiver (clinician), which can be immediate or delayed. Then, when clinicians sought MI advice because they viewed it as a 'help desk', the clinician, acting as the principal was relying on the MI Service, as the agent to do the work for them and is the premise for Agency theory. Furthermore, the basis for Buyer Behaviour Stimulus Response theory is that various stimuli influence the 'customer', in this case the clinician, and produce certain responses. In other words, MI advice influences clinicians, as interaction with MI stimulates 'buying behaviour' i.e. them to change their prescribing.

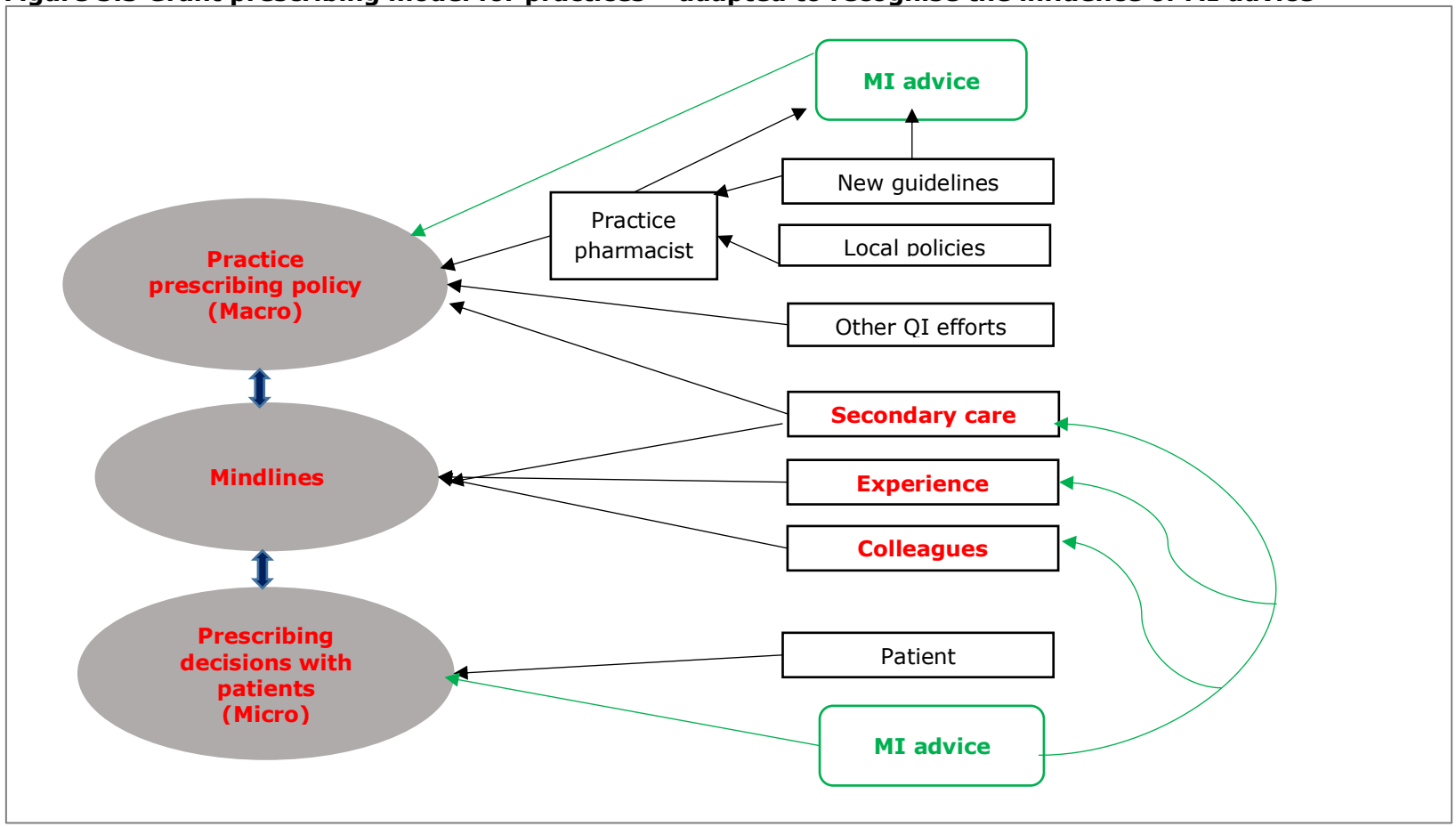
Next, the Grant prescribing model for practices, introduced in Chapter 2, found that well performing practices continually made both macro, and micro-prescribing decisions and produced macro-prescribing policies for staff (Grant, Sullivan and Dowell, 2013). The conceptual prescribing model produced by the authors is shown in Figure 5.3 and I have added the green 'MI advice' boxes to show where MI advice fits in this model. Original text from the model has been changed to red to indicate where I think MI advice complements this model, based on my findings.

Figure 5.2 Ali Murshid model of doctor prescribing decisions - adapted to recognise the influence of MI advice



Note: MI Advice boxes (GREEN) are additions to the original model and (GREEN arrows) show how these relate to it. All other text and arrows are in the original model, however text highlighted in RED indicates where MI advice contributes to the model.

Figure 5.3 Grant prescribing model for practices – adapted to recognise the influence of MI advice



Note: MI Advice boxes (GREEN) are additions to the original model and (GREEN arrows) show how these relate to it. All other text and arrows are in the original model, however text highlighted in RED indicates where MI advice contributes to the model.

In my study clinicians described how they sought MI advice when they were unable to use their 'mindlines' to make micro-prescribing decisions i.e. for individual patients. They viewed it as a more accessible alternative to asking other clinicians in secondary care, when their colleagues were unable to help, or when they were also unsure what to do. They then used MI advice to update their own 'mindlines', sometimes sharing it within their wider 'community of practice', members of which also used it to update their own 'mindlines'. Linking my findings to the Grant model shows how MI advice played a role in influencing not only macro-prescribing policy, but also micro-prescribing decisions, which was not a pharmacy-related finding in the Grant study, as pharmacy (through practice pharmacists) had a role at the macro-level only (Grant, Sullivan and Dowell, 2013). The authors found that practice pharmacists were necessary to inform macro-prescribing policies by filtering research, interpreting and applying evidence to the local population, and leading on prescribing practice. However, in my study, MI Services played a part in filtering, interpreting and applying the evidence, either to the wider population or for individual patients.

Finally, my findings illustrate how MI advice was able to influence prescribing change through a variety of routes and also correlate to the three models of prescribing change suggested by Armstrong, introduced in Chapter 2 (Armstrong, Reyburn and Jones, 1996). This study describes how MI advice influenced prescribing change via the Accumulation model by acting as an independent, trusted source of advice; via the Challenge model by averting an actual or potential prescribing error, i.e. by acting as a safety net for clinician decision-making and enhancing prescribing, or being seen as providers of up to date advice i.e. a 'help desk'; and via the Continuity model by providing advice and information that clinicians are able to assimilate, which means they are willing to make prescribing changes, which can then lead to a shift in their prescribing practice.

This is the first study to link MI advice to theoretical models of decision-making and prescribing, which is important as this shows how the MI Service plays a key role in influencing prescribing decisions and its value as a non-patient-facing service should not be underestimated.

In the next section, I discuss the limitations of this research and finally present my conclusions.

Research limitations

This study inevitably has a number of limitations. Some features of the research design and problems that arose during the research itself may have affected the quality of the findings. I acknowledge the various issues and explain them below.

Due to the limitations of part-time doctoral study, part-time work and time available for the pharmacy students to do interviews. Doing the telephone interviews meant that the time for data collection was limited. Ideally interviews should have been transcribed and analysed before the next, but I had to take a pragmatic approach, so some were not done until after data collection was complete. Time available for data collection was also a restriction for the face-to-face interviews as they took place at times convenient to the clinicians but also needed to be convenient for myself as the interviewer. I tried to be as flexible as possible, sometimes altering my working pattern or hours to enable an interview.

I was fortunate the face-to-face interviews were sent to a professional, external transcriber, however the turnaround time was dependent on transcriber workload. As a result I was not always able to immerse myself in or reflect on the data from individual interviews until after completing further interviews. Consequently, I was not able to amend the interview questions based on formal analysis. Although, as the sole interviewer I was able to reflect on how I felt each face-to-face interview had progressed.

A number of interviewees could not recall the case when first being spoken to, however, all did so when prompted with the MI question and answer. Memory recall in these cases may have affected the quality of responses, especially those with greater time between the answer and interview. However, using the CIT and explicitation techniques helped with recall, whereby clinicians were reminded of their MRQ, the time and date and the advice provided by the MI Service. Interviewees were reminded of their question when they were

first emailed, again when the interview date was agreed and at the start of the interview. Additionally, in some cases the outcome for the patient was unknown as the interview took place too early for the clinician to comment on this aspect. Although, postponing and rescheduling the interview was a possibility, this was not pursued to due to rescheduling with busy clinicians and the fear of loss to the study.

Occasionally during the course of an interview, I was drawn into general discussion about the MI Service. Where possible I asked if their questions about service provision, or a new MRQ they had, could be addressed at the end of the interview and interviewees were happy to do this.

Determining thematic (data) saturation for the telephone interviews was problematic; firstly despite training, the pharmacy students lacked practice experience and found gaining rapport with clinicians difficult, which on occasion, hindered the quality of answers received; secondly, I acknowledge that the telephone interviews were short; although this was not unexpected, as recruiting primary care doctors and dentists was anticipated to be difficult.

The possibility of researcher bias exists, as an MI pharmacist, I was working as an insider researcher (Costley, Elliott & Gibbs, 2010). However, questions I answered as an MI pharmacist were excluded, also I have been transparent throughout regarding my role as an insider researcher and I believe the findings speak for themselves, as exemplified by the interview extracts provided. Although I may have influenced some of the findings, coding and theme development were analysed inductively for all data sets and checked by non-MI pharmacists during analysis of the telephone interviews. Rather, my role as an insider researcher was invaluable as I had could understand context and had a sense of the situation, regarding the MRQs asked, MI advice provided, and the ability to probe clinicians to expand on their responses.

Additionally, responder bias may have confounded the findings. Those with a more positive opinion (i.e. repeat users of the service made up the majority of the sample) may have been more likely to participate in the study (self-selection bias) and be inclined to provide answers (social desirability bias) that portrayed the service in a positive light given that as the researcher, I also

represented that organisation. In fact, as clinicians were satisfied with the service, they wanted to help with the research, so were willing to be interviewed. They may not have been as amenable with an outsider researcher, and for my analysis I was able to consider their responses based on their medicines question and the advice provided, which an outsider researcher may not have done.

While the telephone interviews did provide some valuable qualitative responses, they did not reveal as much detail about how clinicians used MI advice in their decision-making and patient care as I hoped. This was probably hampered by the use of final-year pharmacy students to help conduct some of the telephone interviews. Although, they were selected as academically able students (grades over 65% and on track to get a 2-1 or above), were doing the research module of their MPharm degree, and received training and support (about research, the work of the MI Service and interview skills), they were lacking real-life experience of speaking to clinicians, as well as the experience and confidence of applying their clinical knowledge to discuss the MI question and probing to get them to elaborate on a particular issue. However, the telephone interview responses enabled development of themes which were further expanded in the face-to-face interviews.

I felt that interviews were an appropriate means of understanding the perceptions of clinicians, regarding MRQs and their use of MI advice. This study initially gathered a wider, perspective of clinician use of MI advice by national recruitment of clinicians and so interviews were by telephone. Additional in-depth interviews as face-to-face were then used to expand on findings to further understand how clinicians used MI advice. However, this study only included prescribing clinicians in primary care that were recorded as such on MiDatabank®, at the time. Although, other prescribers e.g. nurses, pharmacists, also contact MI Services, they were not specifically recorded as prescribers. This could be considered for further research, if other prescribers could be identified as such via MiDatabank®.

Conclusions of this research

The aim of my research was to understand how primary care clinicians use MI advice and the findings show this. We now have a better understanding about how MI advice influences primary care clinicians in their prescribing decision-making. When they had gaps in their existing knowledge, they described how they used MI advice as a safety net to shape, support or even make their prescribing decisions for them. Fundamentally, they wanted MI advice to support, or complete their complex, and/or time consuming (System 2) research.

Clinicians tend to use tacit knowledge, 'rules of thumb' and 'mindlines' to make prescribing decisions. This study describes how MI advice was incorporated it into clinician 'mindlines' for future use, thus contributing to their (System 1) decision-making for subsequent patients. They were also able to share MI advice within their 'community of practice', which had the potential to develop the 'collective mindlines' of other clinicians, and so be assimilated into the individual prescribing 'mindlines' of others.

We also have a greater appreciation of how clinicians think MI advice affects patient care, in that they described how they found the provision of person-centred evidence-based MI advice empowering, as they felt able to make prescribing changes for their patients confidently and safely. They said how they used MI advice to reassure themselves and their patients; and to support SDM, and perceived their relationship with the patient was improved, especially when they were viewed as taking the time to ask a specialist service.

When they could not sort the problem themselves, ask a colleague or another clinician, they explained how they valued that person-centred evidence-based advice was provided by a pharmacy, MI expert, via an accessible 'help desk' service they could trust. They also described this value in that they could call the service whilst the patient was with them, which avoided the inconvenience of referrals for clinicians and patients, in terms of time spent making, and waiting for, the referral and associated costs. For urgent cases, advice was provided 'just in time', although they said they were prepared to wait for

advice about complex cases, if it saved them time, was quicker than or avoided referral, and minimised risk to themselves and their patients.

Anything which has a positive influence on prescribing is beneficial for clinicians, patients and the NHS alike. This is the first MI study to show how MI advice is incorporated into the 'mindlines' of clinicians and their colleagues to effect subsequent prescribing decision-making and future patient care. It is also the first study to describe where the MI Service fits into the dual process theory of decision-making (Bate *et al.*, 2012) to effect prescribing; to show how MI advice influences prescribers at both the micro (patient) level and wider macro level (Grant, Sullivan and Dowell, 2013). Finally, it is also the first MI study to find that, after getting MI Service advice, clinicians updated their knowledge and adapted this for subsequent patients. This links to the Armstrong model of prescribing change, where consulting a trusted authority about something brings about change (Armstrong, Reyburn and Jones, 1996).

In the next section, I present my recommendations for MI Services, stakeholders and clinicians, and for further research.

Recommendations for practice, policy and further research

Recommendations for practice:

- Clinicians valued the MI Service as a medicines 'helpdesk' which they used in their prescribing decision-making. MI Services need to share the findings of this study with NHS England and other stakeholders, with a view to agreeing funding to develop a nationally recognised, co-ordinated medicines 'help desk' with a central number that is accessible to all prescribing clinicians in primary care.
- MI Services need to focus on answering complex, high risk MRQs from prescribing clinicians in primary care. This means they need to prioritise the development of resources and training so non-MI pharmacists can answer other MRQs.
- The service needs to work with NHS England and other stakeholders to ensure equitable access to key resources that would enable prescribing clinicians to answer some MRQs easily without having to refer to MI

Services. For example, enabling access to key resources to identify foreign medicines, and for complementary medicine interactions.

- The MI Service should proactively review MRQs and collate data to inform providers of core resources about usage and content problems experienced by clinicians. For example, the BNF or providers of CDSS when they flag medicines interactions. MI staff could offer a service to providers of these resources to improve content and usability.
- A further recommendation is to develop and agree clear definitions of impact, patient care and outcome, which are specific to the provision of MI Service advice, and separately defined for clinicians and patients. These could be based on those already defined, by other services such as Health LIS, and then used for future service evaluation and research.

Recommendations for policy:

- Clinicians valued a 'help-desk' service they could access easily, at a time convenient to them. As such, prescribing clinicians should have access to a co-ordinated, support service for their complex and/or high risk medicines questions. Stakeholders need to provide funding to develop a recognised, co-ordinated medicines 'help desk' with a central contact number.
- Clinicians acknowledged technical and resource limitations and valued human contact via a 'help desk' for complex, high risk scenarios. Although, as the NHS becomes more digital and clinicians are more familiar with using technology, stakeholders should invest in alternative options for human contact, such as online webchat.

Recommendations for further research:

- MI Services need to collaborate with Health LIS, as other providers of health and medicines information, and as these services have also struggled to evaluate the effects of their service on clinicians and patients. Collaboration will help minimise duplication of effort and enable sharing of best practice. As Health LIS have already begun to develop a range of tools, which use a range of methods to help them describe their impact and worth, MI Services could use/adapt these tools already produced by Health LIS.

- It would be useful to compare the MI Service with Health LIS, as these are currently separate NHS funded services, for example by comparing answers to MRQs.
- We need to know how non-users of the MI Service answer MRQs and if they answer them correctly, these answers could be compared to those provided by the MI Service.
- Specific outcomes for evaluation of service effectiveness could be developed, agreed using the findings of this study and incorporated into existing tools to evaluate the effects of the MI Service on clinicians and patient care. For example, the themes and meta-themes found in this study could be used to inform further development of robust, properly validated tools. To enable MI Services to contextualise clinician responses, these tools, their content and their findings may need to be linked to the MRQ, enquiry type and answer provided.
- MI Services and Health LIS could collaborate to develop existing 'impact' rating scales, such as those produced by Bramley and colleagues, by using the findings of my study. These could then be validated for use by both services.

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Appendices

Appendix 1: Table of Medicines Information studies included in the review

Study author (Year)	Country	Aim & objectives	Study participants	Study design	Duration	Sampling	Method	Number of participants /enquiries Response rate where appropriate	Outcome measure(s) Key Findings
Cardoni *et al* (1978)	US	To investigate the use of MI answers and the effect on patient care	Clinicians from primary and secondary care, although this was unclear	Retrospective Single site	14 weeks	Patient-specific enquiries	Telephone survey	491 enquiries 430 responses (90%)	• Specific outcome(s) of medicines related problems • Effect on patient outcome 58% of clinicians (n=202) thought the information had affected patient outcomes, and had a positive effect on patients and their care (78%, n=157) as they started or stopped a drug
Golightly *et al* (1988)	US	To document the activity and effectiveness of an MI service	Clinicians and public in primary and secondary care	Retrospective Single site	12 months	All enquiries received	In-house review Enquiries were coded by MI staff with potential outcome	11424 clinician enquiries 16657 public enquiries 34% (n=5702) public enquires related to MRP were coded	Potential outcome codes for public enquiries: • ADR prevented/corrected/explained • Compliance improved/reinforced • Drug interaction prevented/corrected/ explained • Therapeutic failure prevented • Medical problem referred • Drug misuse prevented/corrected In the opinion of MI staff, answers given to the public prevented or corrected about three quarters (76%, n=4333) of medicine-reported problems

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Study author (Year)	Country	Aim & objectives	Study participants	Study design	Duration	Sampling	Method	Number of participants /enquiries Response rate where appropriate	Outcome measure(s) Key Findings
Kinky *et al* (1999)	US	To develop a cost avoidance model to determine potential cost savings of an MI enquiry answering service	Clinicians in secondary care	Prospective Single site	6 weeks	Patient-specific enquiries	Cost avoidance model developed Outcome/severity level assigned by expert panel	163/570 enquiries (29% reviewed)	• Optimal results • Treatment failure • New medical problem • Treatment failure and new medical problem • Costs avoided Using this model, potential cost savings were mostly due to prevention of increased monitoring and/or additional treatment (46%, n=77), although about half the enquiries had little or no measurable cost impact (51%, n=83). Despite this the projected potential minimum annual cost savings were about $1.7 million

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Study author (Year)	Country	Aim & objectives	Study participants	Study design	Duration	Sampling	Method	Number of participants /enquiries Response rate where appropriate	Outcome measure(s) Key Findings
Stubbington *et al* (1998)	UK	To find out how MI replies to enquiries about adverse effects (AE) influenced clinical practice	Clinicians in primary and secondary care	Retrospective Single site	12 weeks	Patient-specific adverse effect enquiries	Postal questionnaire	132/161 (82% response rate)	• Action taken as result of MI answer • Effect on subsequent patient progress • Effect on CPD Almost all respondents (95%, n=125) said they found the information helped, with the authors concluding that the MI service had a favourable impact on patient care in at least 40 patients (30%). The patient progress after the MI advice was known in 79 cases (60%); this included 40 responses of patient improvement A high proportion (89%, n=117) of clinicians acted on the MI advice. These were categorised as: starting new treatments (n=21); stopping treatments (n=20); avoidance of a potential adverse event (n=21) to modify a patient's existing treatment (n=20); to stop an adverse event from getting worse (n=7); and to justify current therapy (n=16)
Marrone *et al* (2000)	US	To determine the economic impact of the MI service by measuring practitioner hours saved (PHS) and associated costs	Clinicians in secondary care	Prospective Single site	12 weeks	All enquiries	Cost analysis PHS calculated by multiplying time to find answer and give a response by average salary for each clinician type	308/347 enquiries (89% of enquiries)	• PHS by use of the MI enquiry service • Potential costs saved by using the MI enquiry service A total of 266 PHS was calculated, which equated to a total annual cost saving of $43,950

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Study author (Year)	Country	Aim & objectives	Study participants	Study design	Duration	Sampling	Method	Number of participants /enquiries Response rate where appropriate	Outcome measure(s) Key Findings
Melnyk *et al* (2000)	Canada	To determine the impact of the MI answers on patient outcomes	Public and clinicians in primary and secondary care	Prospective Single site	14 weeks	Patient-specific enquiries	Semi-structured telephone interviews Initial follow-up after 1-2 days, then up to 6 weeks after MI answer was provided Expert panel	64/68 public (94% response rate) 98/98 clinicians (100% response rate)	• Desired outcome • Actual patient outcome • Enquirer opinion of impact on patient outcome • Views of a clinical panel on impact on patient outcome Seventy-two clinicians (74%) believed the advice had a beneficial impact on the patient, with an expert panel agreeing that 36 (46.8%) had resulted in a positive patient outcome; ten of which were based on objective measures, e.g. reduction in blood pressure. A high number of clinicians acted on MI advice (84% of 230 MI recommendations were accepted) with the highest reported use (41%, n=78) being for provision of information/education, whilst other actions included referral to another clinician (13%), instigation of additional monitoring (10%) and recommending or adding a drug (13%) Of 68 consumer enquiries, 87% of recommendations were accepted and 92% of these were deemed as beneficial to their care

Appendix 1: Table of Medicines Information studies included in the review

Study author (Year)	Country	Aim & objectives	Study participants	Study design	Duration	Sampling	Method	Number of participants /enquiries Response rate where appropriate	Outcome measure(s) Key Findings
SchjØtt *et al* (2002)	Norway	To determine the impact of MI answers on clinicians	Clinicians in primary and secondary care	Retrospective Single site	18 months	All enquiries answered in writing Excluded simple questions answered by telephone	Postal questionnaire	117/163 doctors (72% response rate)	• Change in clinical practice • Use of MI answer with patients More than half (61%, n=71) of respondents stated that the information provided had caused a change in clinical practice, with 68 going on to describe this change. Categorised as changes in pharmacotherapy (n=32), improved advice to patients and colleagues (n=22), stopping a medicine (n=10), avoidance of abortion (n=2), and reporting an adverse drug reaction (n=2)
Maywald *et al* (2004)	Germany	To find out the outcome of MI answers provided to patients	Patients in primary care	Prospective Single site	24 months	Patient-specific enquiries received and answered by telephone	Postal questionnaire	920/1686 (58% response rate)	• Use of MI answer • Action taken • Impact on the patient Over a third (38%) used the knowledge provided to discuss the results of MI advice with their clinician. Over two thirds (68%) respondents reported increased confidence in dealing with prescribed medicines and others said uncertainties about medicines were reduced (81%). Some reported a better state of health after implementing MI advice (20%) and felt advice prevented a visit to their clinician (18%)

Appendix 1: Table of Medicines Information studies included in the review

Study author (Year)	Country	Aim & objectives	Study participants	Study design	Duration	Sampling	Method	Number of participants /enquiries Response rate where appropriate	Outcome measure(s) Key Findings
Joseph *et al* (2004)	UK	To determine impact of a MI patient helpline on patient outcomes	Patients discharged from the hospital or seen as outpatients	Prospective Single site	8 weeks	Patient-specific enquiries	Postal questionnaire Expert panel assessed MI recommendations	58/87 (67% response rate)	• Advice followed • Action taken • Impact on wellbeing Almost all patients who replied (97%, n=58) said they followed the recommendations provided, and overall, two thirds (66%, n=40) said a medicine-related problem was avoided; three quarters (75%, n=45) reported being less anxious
Bertsche *et al* (2007)	Germany	To explore the impact of the MIS on patient outcomes based on clinician judgement	Clinicians in primary care	Prospective Single site	12 months	Patient-specific enquiries	Faxed questionnaire	455/1017 clinicians (45% response rate)	• Potential positive patient outcomes Almost half of the clinicians (42%, n=190) agreed there was a potential positive outcome, and thematic analysis of these responses revealed that MI advice allowed a switch to more suitable medicine, correct/optimum dosing, enhanced adherence or avoided an interaction Clinicians could also be seen to use MI advice to help with their own risk/benefit assessment

Appendix 1: Table of Medicines Information studies included in the review

Study author (Year)	Country	Aim & objectives	Study participants	Study design	Duration	Sampling	Method	Number of participants /enquiries Response rate where appropriate	Outcome measure(s) Key Findings
Frost Widnes *et al* (2009)	Norway	To assess the clinical impact of MI answers provided about medicines in pregnancy question	Doctors in primary and secondary care	Prospective Multicentre (n=5)	12 months	Patient-specific pregnancy enquiries	Postal/email questionnaire	123/162 (76% response rate)	• Importance of answer on therapeutic decision • Use in decision making: • Asked if agreed with the statement: • *"the answer from the* [MIS] *was important for my therapeutic decision"* MI advice was used to avoid termination (9%, n=11), although frequently it informed them to either avoid/stop a medicine (29%, n=36) or start/continue a medicine (38%, n=47) The majority agreed (95%, n=111) advice was important in their therapeutic decision making Clinicians could also be seen to use MI advice to help with their own risk/benefit assessment
Hedegaard *et al* (2009)	Denmark	To evaluate the clinical impact of MI answers	Doctors in primary and secondary care	Prospective Single site	12 months	Patient-specific enquiries answered in writing	Initial interviews to inform content of postal questionnaire	183/197 (93% response rate)	• How MI answer was used Most doctors (93%) used the MI answer, with many using the answer for patient information (79%), to change treatment (45%), to disseminate to colleagues (51%) and for future use with patients (67%)

Appendix 1: Table of Medicines Information studies included in the review

Study author (Year)	Country	Aim & objectives	Study participants	Study design	Duration	Sampling	Method	Number of participants /enquiries Response rate where appropriate	Outcome measure(s) Key Findings
Bramley *et al* (2009)	UK	To find out: Proportion of enquiries where MI advice was used in patient care What clinicians did with information provided If had a direct impact on outcome Proportion of enquiries were clinician waiting for answer before proceeding Minimum expected level of clinician uptake of MI answers	40 clinicians Presumably mostly from secondary care, although this was not specified	Prospective Multicentre (n=2)	2 weeks	Patient-specific enquiries	Semi-structured telephone interviews at 7 to 28 days post enquiry being generated	32 interviewed	• Number of enquiries used answer/followed advice • Number of enquiries answer changed patient management • Action taken as a result of MI answer • Number of enquiries were waiting for MI answer before going ahead • Number of patients whose clinical outcome differed compared to expected Thirty-two clinicians were available for follow-up, of which 59% (n=19) of patient outcomes were as expected, three (9%) had improved further than expected, although six (19%) had not improved compared to what had been anticipated 30 (94%) clinicians had used the information provided, most frequently to start a medicine (25%, n=8), to change administration/dosing (9%, n=3) or not to start a medicine (9%, n=3)
McEntee *et al* (2010)	UK	To assess how MI answers were used by clinicians and usefulness in patient care	Clinicians in primary and secondary care	Prospective Single site	6 months	Patient-specific enquiries	Postal/ email questionnaire	459/672 (68% response rate)	• How MI advice was used • Use in patient care Many respondents (81%, n=430) acted on the MI answer provided. They used this information to manage a current patient or to plan care of future patients (29%), for CPD purposes (24%) and for training/teaching (16%)

Appendix 1: Table of Medicines Information studies included in the review

Study author (Year)	Country	Aim & objectives	Study participants	Study design	Duration	Sampling	Method	Number of participants /enquiries Response rate where appropriate	Outcome measure(s) Key Findings
Innes *et al* (2014)	UK	To determine the impact of MI advice on patient care and outcomes	Clinicians in primary and secondary care	Prospective Multicentre (n=62) (33% of UK MI centres)	Unclear-max 8 weeks?	Patient-specific enquiries	Two online questionnaires with a 5-point rating scale about impact of MI advice on patient care & outcomes 1st questionnaire completed by MI centre at the time of the enquiry 2nd questionnaire emailed to enquirer Expert panel assessed a random sample of answers (24/40) using a 6 point rating scale	647/1450 (45% response rate)	• Use of MI answer • Impact of MI answer on patient specific measures using a rating scale i.e. ADRs; Safety/risk; Patient concerns; Information provided; Patient understanding; Choice of medicines • Ability to explain risks/benefits to patient • Overall impact of MI answer on patient care and outcomes The majority of respondents self-reported that the advice had a positive impact on their patients (92%, n=597/647), with 85% (n=547) considering this was positive regarding patient care or outcome. Furthermore, around half (53%, n=343) agreed MI advice reduced/decreased risk of an ADR and positively affected lowering risk/improving safety (58%, n=374) 48%, n=311 of respondents stated they used it to check the safety or risks of treatment 44%, (n=79) agreed that the MI advice played a part in their decision-making process They felt MI advice helped their ability to explain risk/benefit to the patient

Appendix 1: Table of Medicines Information studies included in the review

Study author (Year)	Country	Aim & objectives	Study participants	Study design	Duration	Sampling	Method	Number of participants /enquiries Response rate where appropriate	Outcome measure(s) Key Findings
Bramley *et al* (2013)	UK	To determine the impact of MI advice on patient care and outcomes	Clinicians in primary and secondary care	Prospective Multicentre (n=35 centres in 3 regions in England)	Unclear-max 8 weeks?	Patient-specific enquiries	Two online-questionnaires completed 2 weeks apart from generation of enquiry. Survey included a 5-point rating scale about impact of MI advice on patient care /outcomes Expert panel assessed a purposive sample (20/24) of answers using a 6 point rating scale Lead investigator assessed all answers using the same 6 point rating scale	Unclear how many clinicians were initially recruited 316 sent 1st questionnaire 179 responses after 2nd questionnaire (57% response rate)	• Were they waiting for MI advice before going ahead • Planned action after had MI answer • Action taken after MI answer • Rating scale to measure impact on patient care and outcomes The majority of enquirers (81%, n=145) rated the impact on patient care or outcome as positive: 20% (n=35) said it improved patient outcome and 62% (n=110) replied that their patients' care was improved. Only 15% (n=27) reported no impact. No negative outcomes or cases of worsened patient care were reported. An expert panel purposively reviewed 20 cases, and found that 19 (95%) of cases had a positive impact on patient care A quarter (n=44) continued the medicine, while others started a medicine or changed the drug regimen (21%, n=37 for each), with a quarter taking more than one of the listed actions (24%, n=43). Half (54%, n=97) used advice to check medication safety, 30% to tell them the best plan of action and 22% to confirm a change in therapy was needed. 44% (n=79) agreed MI advice played a part in their decision-making process Clinicians could also be seen to use MI advice as a risk management tool, to allow medication safety checks

Appendix 1: Table of Medicines Information studies included in the review

Study author (Year)	Country	Aim & objectives	Study participants	Study design	Duration	Sampling	Method	Number of participants /enquiries Response rate where appropriate	Outcome measure(s) Key Findings
Strobach *et al* (2015)	Germany	To study the impact of MIS on clinical decision making	Doctors in secondary care	Prospective Single site	12 months	Patient-specific drug-drug interaction (DDI) enquiries answered in writing	Structured telephone interviews Interviewed 3 to 60 days after answer provided	113/127 (89% response rate)	• All actions taken after MI answer About half of 232 clinical actions (49%, n=114) were considered to be due to MI advice, and included starting a medicine (n=34); stopping/not starting a medicine (n=21); modifying drug treatment (n=15); clinical monitoring (n=22); specific patient counselling (n=14) and modifying doses (n=6)
Badiani *et al* (2017)	UK	Did patients follow advice given after contacting an MI patient helpline	Patients and carers	Prospective Single site	9 months	All callers included until 100 surveys were received	Questionnaire	100/157 (64% response rate)	• Patient outcome after using helpline 68 patients, Almost all (96%) followed the advice to some degree. Respondents believed advice received had avoided a medicine related problem (27%) or the medicine problem had resolved (52%). Almost half (45%) of the respondents stated they felt reassured after gaining the advice
Bramley *et al* (2018)	UK	Assess patient experience, satisfaction and outcomes after contacting patient helpline	Patients	Prospective Multicentre (n=2)	4 to 6 weeks	All callers	Questionnaire Expert panel assessed a sample of enquiries using 2 rating scales: patient care/outcome and medicines safety Delphi technique with focus groups to validate scales	67/111 (60% response rate)	• Patient outcome after using helpline • Development and validation of impact rating scale Almost all (93%) respondents followed the advice provided and felt reassured (81%) after checking about medicine safety and usage. A small number (19%) reported improved health or cure following advice received

Appendix 2 Rating scales used by expert panels

	Bramley 2013		Innes 2014	
Rating	**Impact of MI advice**	**Descriptor**	**Impact on**	**Descriptor**
1	Adverse impact	Detrimental effect on patient care or outcome AND/OR Increased the risk to the patient	Risk/safety Patient care or outcome	The advice from MI *increased the risk* to the patient The advice from MI had a *detrimental effect on patient care or outcome*
2	No impact	No effect on patient care or outcome AND/OR No effect on the risk to the patient	Risk/safety Patient care or outcome	The advice from MI *had no effect on the risk t*o the patient The advice from MI had *no effect on patient care or outcome*
3	Some positive impact	Positive effect on patient care but no apparent improvement in patient outcome AND/OR Low risk to the patient was avoided	Risk/safety Patient care or outcome	The advice from MI meant that a *low risk to the patient was avoided* The advice from MI *improved the care of the patient but was unlikely to lead to an improvement in patient outcome*
4	Positive impact	Positive effect on patient care likely to lead to an improvement in patient outcome But no improvement in patient outcome apparent AND/OR Moderate risk to the patient was avoided	Risk/safety Patient care or outcome	The advice from MI meant that a *moderate risk to the patient was avoided* The advice from MI *improved the care of the patient* and this was *likely to lead to an improvement in patient outcome (*no improvement in patient outcome apparent)
5	Very positive impact	Positive effect on patient outcome AND/OR a very positive effect on patient care AND/OR Major risk to the patient was avoided	Risk/safety Patient care or outcome	The advice from MI meant that a *major risk to the patient was avoided* The advice from MI *improved the patient outcome* OR had a *very positive effect on patient care*
6	Extremely positive impact	Potentially life saving AND/OR Extreme risk to the patient was avoided	Risk/safety Patient care or outcome	The advice from MI meant that *an extreme risk t*o the patient was avoided The advice from MI was *potentially lifesaving*

Note: The rating scale has subsequently been updated in Bramley 2018

Appendix 3: UK MI Service enquiry levels

Level description	Guidance notes	Examples
Level 1		
Simple enquiries or data	• Requests for information which any pharmacist or accredited pharmacy technician would be expected to deal with using readily available sources. • Enquiries answered solely using sources such as local formulary/guidelines, paediatric formularies, or electronic databases such as Drugdex. • Information from such sources passed on to the enquirer without further evaluation or interpretation.	• Requests for standard dosing information and/or administration instructions for licensed, or commonly accepted unlicensed indications. • Basic information about well-documented adverse effects. • Identification of foreign drugs. • Tablet identification using TICTAC (either directly or by contact with the regional MI centre) where further advice not required. • 'Librarian services' such as finding a particular reference on Medline for which some details are known. • Requests to contact the pharmaceutical industry for basic information about the availability, or excipient content.
Level 2		
Complex enquiries – multiple sources	• Enquiries that require the use of more specialist resources and/or the interrogation of multiple sources. • Enquiries where application of medicines information skills and knowledge is needed, but sources provide a reasonably clear answer or course of action to offer the enquirer.	• Dosing information for unlicensed indications. • Intravenous drug compatibilities not found in standard sources e.g. admixtures or Y-site compatibilities. • Dosing adjustments for commonly-used drugs in organ failure. • Information about previous case reports of an adverse drug reaction. • Safety of drugs in pregnancy/lactation where published reviews give clear advice (but see below).
Level 3		
Complex enquiries – professional judgement	• Enquiries where the answer relies on the knowledge, experience and skill of the MI practitioner. • Core concepts of therapeutics, risk management and literature evaluation are applied. • Complex enquiries that cover situations where individual patients have unusual co-morbidities or drug combinations.	• Identifying the most likely causative agent of an adverse drug reaction and advising how to manage the patient. • Offering advice on an appropriate therapeutic regimen when standard options have failed and there is no literature consensus. • Evaluating the safest and most effective treatment where there are multiple contra-indications or cautions. • Calculating drug doses using the first principles of pharmacokinetics or therapeutic drug monitoring. • Assessing the appropriateness of new/experimental treatments for a patient by appraising published clinical data. • Advising on the safest injectable medicines to mix when mixing is unavoidable but there is no directly relevant published compatibility data.

Guidance notes for ranking enquiries

Level is independent of the *time taken* to complete the enquiry.

Level is independent of the *method* used to communicate the answer.

There is a degree of subjectivity when assessing levels; no system can completely remove this.

The way an enquiry is received may partly determine its level. The questioning skills of experienced MI staff may turn an apparently straightforward level 1 enquiry into a level 2 or 3 once the full clinical implications have been teased out.

Examples are for guidance only; some categories of enquiry may sometimes fit better into another. E.g. enquiries about drugs in pregnancy and lactation (listed as levels 2 and 3) may sometimes fit into level 1 if the drug concerned is widely used in pregnancy and its safety is well known.

Ref: UKMI Enquiry Level Quick Guidance Notes
https://www.sps.nhs.uk/articles/ukmi-enquiry-answering/

Appendix 4: Ethics approval (telephone interviews)

RES20A	Jill Rutter	R Morgan P Rutter	What effect do medicine information (MI) answers provided to primary care prescribers have on patient care?	8/04/11 1. Procedures seem to be satisfactory, but the consent form appears to be missing 2. The investigator mentions that the interviews will be audio-recorded, but this should be made more explicit to the participants at the outset 3. Data should be held for 5 years prior to disposal, and should be accessible to both the research supervisor and any potential examiners. 4. The information sheet states that "a copy of the results will be sent to participants". The investigator needs to state that results will be made available upon request (perhaps ask participants at point of phone-in), and that no individual results will be made available. ***04/11 – once amendments had been made this was APPROVED via Chairs Action***

Appendix 5: Telephone interview guide

UNIVERSITY OF WOLVERHAMPTON

Impact of Medicines Information Answers: an evaluation of Primary Care Prescriber Decision-making

Section A: Background Information *(To be populated by Principal Investigator)*

Call taken by (UKMi Centre):_____

GP ☐ Dentist ☐

Enquiry Number: _____

Enquirer Details _____
(Name & telephone number) _____

Details of enquiry

Answer to enquiry

Notes on possible outcomes

BEFORE ASKING ANY QUESTIONS:

a. Introduce yourself;
b. State the purpose of the call;
c. Ask them if they still want to continue with the survey;
d. Determine if now is a good time or the need to call back later;
e. If appropriate, talk them through the key 'participant information';
f. Confirm they still want to take part (verbal consent).
See sheet: verbal information for potential participants

IF THEY AGREE TO TAKE PART, REMIND THEM OF THE QUERY THEY ASKED & THE ANSWER GIVEN

Section B: Evaluation of Impact of Medicines Information Answers: an evaluation of Primary Care Prescriber Decision-making

1.	Before contacting the MI service did you consult anyone else/any information sources?	Yes ☐	No ☐ *Go to Qu 4*

2. If Yes, who did you ask?
Researcher Note: Ask about company/other health care professionals. e.g. colleague, GP, community pharmacist, PCT pharmacist)

3. If Yes, what information sources did you use?
Researcher Note: Ask about books/websites etc.

4. What prompted you to call the Medicines Information service?
Researcher Note e.g. Used MI before and found it helpful/Found conflicting information and not sure what to do
No time to look into, so thought I'd call you/computer warning/Someone else asked me a qu/No in BNF/Letter from Specialist

5.	Did the answer provide you with enough information to make a decision about how to manage your patient?	Completely ☐ *Go to Qu 6*	Partly ☐ *Go to Qu 7*	Not at all ☐ *Go to Qu 7*

6. If Completely, why?

7. If Partly/Not at all, why not?

8. On a scale of 1 to 5, where 1 is "not very helpful" and 5 is "very helpful"
Overall, how helpful was the information in deciding how to manage the patient?

Not very helpful				Very helpful
1	2	3	4	5

9. What action did you take as a result of the advice provided by the Medicines Information service?
Researcher Note
e.g. Choice of therapy: Started drug X/referred to specialist. ADRs: stopped drug X/started drug X
Dose & Administration: Changed dose A of drug X to Dose B of drug X. Changed drug X from route A to route B
Interactions: stopped drug X and started drug Y. Pregnancy: stopped drug X/started drug Y
Breast feeding: stopped drug X/started drug Y

10. What influence did the advice provided by the Medicines Information service have on your decision?

11. What other issues did the Medicines Information service make you aware of (if any)?

12. What other factors did you consider to help you make your decision?
Researcher Note e.g. drugs tried already/co-morbids/patient circumstances/patient discussion/colleague advice,

13. What happened to the patient as a result of the advice provided by the Medicines Information service?
Researcher Note e.g. Choice of therapy: patient took drug & condition improved. ADRs: resolved/still present/too soon to say
Dose & Administration: Stopped &/started drug X & condition improved. Interactions: Switched to drug X & condition improved
Pregnancy: pregnancy ongoing & condition improved. Stopped drug X/started drug Y & pregnancy going well
Breast feeding: still able to breast feed and condition improved

14. Overall, what effect did the MI advice have on the care of your patient?

15.

Is the problem still ongoing?	Yes ☐	No ☐	Unsure ☐

		Go to Qu 19	Go to Qu 19

16. If Yes, what have you done since to manage the problem?

17. Did you get any subsequent information/advice	Yes ☐	No ☐ Go to Qu 19	Unsure ☐ Go to Qu 19

18. (If Yes), Where did you get any subsequent information/advice?
Researcher Note: e.g. company/books/website/colleague/GP/hospital consultant/community pharmacist/PCT pharmacist/website

What information/advice did you get?

19. Did you record the Medicines Information advice in the patient notes? Yes ☐ No ☐

Section C:

"Now I am just going to ask you a few general questions"

20. Have you used the Medicines Information Service before?	Yes ☐	No ☐

21. On a scale of 1 to 5, where 1 is "not very likely" and 5 is "very likely", will you use the Medicines Information service again?

Not very likely				Very likely
1	2	3	4	5

22. On a scale of 1 to 5, where 1 is "not very likely" and 5 is "very likely", how likely are you to recommend the Medicines Information service to colleagues?

Not very likely				Very likely
1	2	3	4	5

23. How long have you been qualified?	_____Years

24. And finally, would you like to receive a copy of the final results of this study?	Yes ☐	No ☐

Thank you very much for your time, the information you've provided will be very useful.

Verbal information for potential participants

a. Introduce yourself;

b. State the purpose of the call;

c. Ask them if they still want to continue with the survey;

d. Determine if now is a good time or the need to call back later;

Phoning to arrange telephone interview
If get reception/someone else:

Hello, can I speak to Dr/Mr/Mrs [insert title]. I'm calling about an NHS medicines information survey. Dr/Mr/Mrs [insert title] said they were happy to be contacted to arrange a suitable time.
Are they available?

If No – When is the best time to call back?
If Yes & they transfer you – introduce yourself as below*

If speak directly to the enquirer:
Hello, am I speaking to Dr/Mr/Mrs [insert title]? I'm calling about an NHS medicines information survey. You recently contacted the medicines information service with an enquiry about [XXXXXXX] and indicated that you would be happy to be contacted to discuss how you used the advice provided.

If **Yes –** Is now a good time?
If **No** – When is the best time to call back?

If **No** – thank them for their time and apologise for taking up their time:

That's fine, thank you for your time.

If **No, not now** - try to arrange a convenient time to call back:

I'm happy to call you back later today when it's more convenient. When would be the best time?

If **No, not today:**

I'm happy to call you back another day when it's more convenient. When would be the best time?

Phoning to do telephone interview
If get reception/someone else:

Hello, my name is [XXXXXXX], I'm a pharmacy student from Wolverhampton University calling about an NHS medicines information survey, Dr/Mr/Mrs [insert title] is expecting my call.
They recently contacted the medicines information service with an enquiry about [XXXXXXX] and indicated that you would be happy to be contacted TODAY.

If speak directly to the enquirer: *

Hello, my name is [XXXX], I'm a pharmacy student from Wolverhampton University calling about an NHS medicines information survey, am I speaking to Dr/Mr/Mrs [insert title].
You recently contacted the medicines information service with an enquiry about [XXXXXXX] and indicated that you would be happy to be contacted [TODAY/This Morning/This afternoon] to discuss how you used the advice provided. Is that correct?

If **No** – thank them for their time and apologise for taking up their time:

> That's fine, thank you for your time.

If **No, not now** - try to arrange a convenient time to call back:

> I'm happy to call you back later today when it's more convenient. When would be the best time?

If **No, not today:**

> I'm happy to call you back another day when it's more convenient. When would be the best time?

If **Yes**, continue with script below.

Do you have **10-15 minutes** for me to ask you a few questions?

If **Yes**, then continue.

Before I can ask you any questions can you confirm you read the emailed information about the study, including the information sheet.

If **Yes**, skip script below and move to confirmatory questions.

If **No not read the emailed information**, then continue with script below.

e. Talk them through the key 'participant information';

f. Confirm they still want to take part (verbal consent)

You are invited to complete a telephone interview as part of an evaluation of the UK Medicines Information Service, which you recently contacted. The purpose of the study is to see how the information provided was used. The interview will be recorded to ensure accuracy.

You do not have to participate and we will ask you to verbally agree to take part after I have provided you with this information. Even, after you agree to take part you can still withdraw at any time, without a given reason even after you have answered all the questions. It is possible that you may not wish to answer one or more of the questions, please just let me know.

Any information you provide will be kept confidential and not be shared with a third party. It will only be seen by the investigators. Any information that relates directly to you will be made unidentifiable and all paper and electronic records will be destroyed after 5 years.

Finally, this study has also been approved by the University of Wolverhampton Ethics Committee.

Confirmatory Questions:

Would you like to ask any questions?

If **No**,

Let's begin the survey?

IF THEY AGREE TO TAKE PART, REMIND THEM OF THE QUERY THEY ASKED & THE ANSWER GIVEN

At the end of the survey,

Thank the person for their time and close the call (see survey tool).

Appendix 6 Ethics approval (face-to-face interviews)

LSEC201314/71	Jill Rutter	Paul Rutter	What influence does medicine information (MI) advice have on prescriber decision making?	26/3/14 Not Approved - Defer to next meeting Amendments: Concern regarding project title which is not the same throughout document. Student needs to provide evidence that those contacted have given their consent to be contacted via the database e.g. whether there is a tick box on the database stating that GPs using the service have agreed to be contacted. If not, evidence that the student is following UKMI data protection guidelines should be provided. If this is not possible, alternative routes of contact should be considered. Student to be aware that the project will be approved as a pilot study and as such, a completion date should be provided. A follow-on study would need a new submission detailing changes for approval by the Life Sciences Ethics Committee. **29/04/14 – APPROVED**

Appendix 7: Face-to-face Interview topic guide (schedule)

Before asking any questions

- ☐ **Introduce yourself;**
- ☐ **State the purpose of the interview;**
- ☐ **Ask them if they have read the participant information sheet;**
- ☐ **If not, talk them through the participant information;**
- ☐ **Confirm they still want to take part (signed consent form).**
- ☐ IF THEY AGREE TO TAKE PART, REMIND THEM OF THE QUERY THEY ASKED & THE ANSWER GIVEN

Interview topic guide (schedule)

Interviewer answers any participant questions, ensures participant has had an opportunity to read the information leaflet and has signed the consent form

Introduction:

You asked the MI service about [*insert question here*] on [*insert date here*].
I'd like you to describe what happened, from the initial patient encounter right through to receiving our advice and subsequently what happened afterwards?
I will then ask some questions to follow up on any specific issues that crop up during our conversation?

PART I: Recent medicines case & MI advice:

- Tell me what happened in this case about [……..]

Additional questions:
- What prompted you to call?
- How did you use our advice?
- How did this advice affect your decision-making?
  Prompts:
    - Explain how you decided what to do next/about [……..]?
    - What (else) did you do after getting MI advice?
      e. g. patient discussion/colleague discussion/record in patient notes

- How did you feel after getting our advice?
- What happened with the patient?
  Prompts
    - Describe how you used our advice with this patient?
      N.B.

      Explore effect of advice on relationship with patient.

      Explore use in shared decision-making

- If you hadn't called MI for advice, what would you have done?
  i.e. how do you think you would have sorted the problem out?

PART II: General

Questions around key themes from phone interviews:

Risk

- Other prescribers have described how they used UKMI advice to minimise risks to themselves and/or their patients. What do you think about this?

Use of advice for reassurance/to confirm thinking

- Other prescribers have described how MI advice reassures them and/or helps confirm what they were thinking when they were unsure what to do. What are your thoughts on this?

Practising evidence-based medicine

- What does EBM mean to you? (*link with patient care*)
- Tell me about sources of medicines advice you use
- Tell me how you ensure you practice EBM
- How does MI advice fit with this?

Practical/timely advice

- Other prescribers have described the practical nature of MI advice. What do you think about this?
- Other prescribers have described the timely nature of MI advice. What do you think about this?

Clinical decision-making:

- Tell me how you generally make clinical decisions about medicines*?*
  Prompts:
    - Please explain your thought processes
    - What factors do you consider?
      (e.g. previous cases seen; experience; weighting; time)
    - What else do you do?

Repeat users only:

- Describe how MI advice fits into your clinical decision-making
  Prompts
    - What else do you do?
      e. g. discussion with GP colleagues/hospital specialist)
    - What happened in another case that you can remember?

Patient care: (*Repeat users only*)

- Explain how MI advice influences your patient care?
- Tell me a bit more about how you use MI advice with your patients
- In your opinion, how does MI advice impact on patient outcomes?
  Prompts
    - What happened in another case you can remember?
    - Give some examples of patient outcomes
    - What do you discuss with them?
      e g. What do you tell them about our service?

MI Service:

- *Repeat users*:
    - When do you tend to contact us for advice?

- *First time users*:
    - What triggered you to contact us? (*if not fully explained in Part I*)
    - Why have you not used us before?
- What would happen if you couldn't get MI advice?

Please tell me anything else you would like to raise about this topic that we haven't already discussed.

Thank you etc.

Appendix 8a: Inductive coding of the telephone and then the face-to-face interviews

Process of coding the telephone interviews

- Constant comparison was used, for example,
  - 1st interview =8 codes
  - 2nd interview +6 codes
  - 3rd interview +7 codes
  - 4th interview +3 codes
  - After each cycle I re-checked previously coded interview transcripts for new codes
- 111 free nodes (codes) were condensed/combined into 13 Tree nodes and 64 nodes
- In total 3 full cycles of coding were completed for all telephone interviews, with fewer new codes added and only 1 code and no new codes added in the third cycle

Codes for Telephone Interviews

Name of code (node)	Sources (Interview transcripts)	Number of references to code
Advertising & Publicity	10	12
Advice		
Answer appropriate	11	11
Confirmed Prescriber Thinking	14	16
Consultants Advice	8	11
Degree of influence	17	18
Detailed advice	4	5
Difficulty recalling the advice	4	4
Other Issues Made Aware of	4	4
Practical advice	19	24
Evidence		
Changing prescribing habits	1	1
Evidence base changed	1	1
Evidence based	11	20
Financial	1	1
Cost	2	2
Knowledge		
CPD	9	15
Updated knowledge of others	2	2
Medicines Information		
Helpful	9	12
MI Service	6	9
Professional service	2	2
Role of MI	2	2
Trusted Source	7	8
Useful Service	11	13
Value of Medicines Information	5	9
Patient Outcome		
Negative Patient Outcome	2	3

Name of code (node)	Sources (Interview transcripts)	Number of references to code
Outcome Unclear or Too Soon	14	17
Positive Patient Outcome	25	31
Prescriber Action		
Changed management of patient	4	6
Deferred responsibility	5	11
Empowerment	20	27
Information sharing	3	3
Other Factors Considered	21	25
Patient circumstances	15	24
Patient Discussion	23	32
Prescriber Discussion	5	5
Procedure performed	2	2
Use of Advice in Patient Care	39	59
Prompts for calling MI	41	45
Complex Queries	14	18
Positive Prior Experience	25	27
Recommendation by someone else	9	9
Another HCP	1	1
Colleague	5	5
Professional body	1	1
Trainer	2	2
Used MI Before	31	32
Referral	4	6
Resources		
Information Difficult to Find	9	10
Information Sources after MI - not people	2	3
Information Sources after MI - People	10	11
Information Sources B4 MI - not people	35	37
BNF B4 MI	31	31
Information Sources B4 MI - people	19	21
Colleague B4 MI	11	12
Specialist B4 MI	5	5
Information sources unhelpful	21	29
BNF Unclear or didn't help	15	19
Colleague didn't know	2	2
Community pharmacist could not help	5	7
Risk Management		
Record of MI advice	15	16
No Record	3	3
Safe Prescribing	18	21
Second opinion	13	15
Second opinion unhelpful	4	4

Name of code (node)	Sources (Interview transcripts)	Number of references to code
Seeking clarification	23	29
Seeking Evidence	4	5
Seeking Reassurance	18	31
Time Factors		
Convenient	9	13
Time Constraints	4	7

Process of coding the face-to-face interviews

- Constant comparison was used, as described above
- The second cycle of coding found 3 new codes in interviews 11 and 12
- No new codes were found in interviews 13-15
- 83 free nodes (codes) were condensed/combined into 9 Tree Nodes and 81 codes

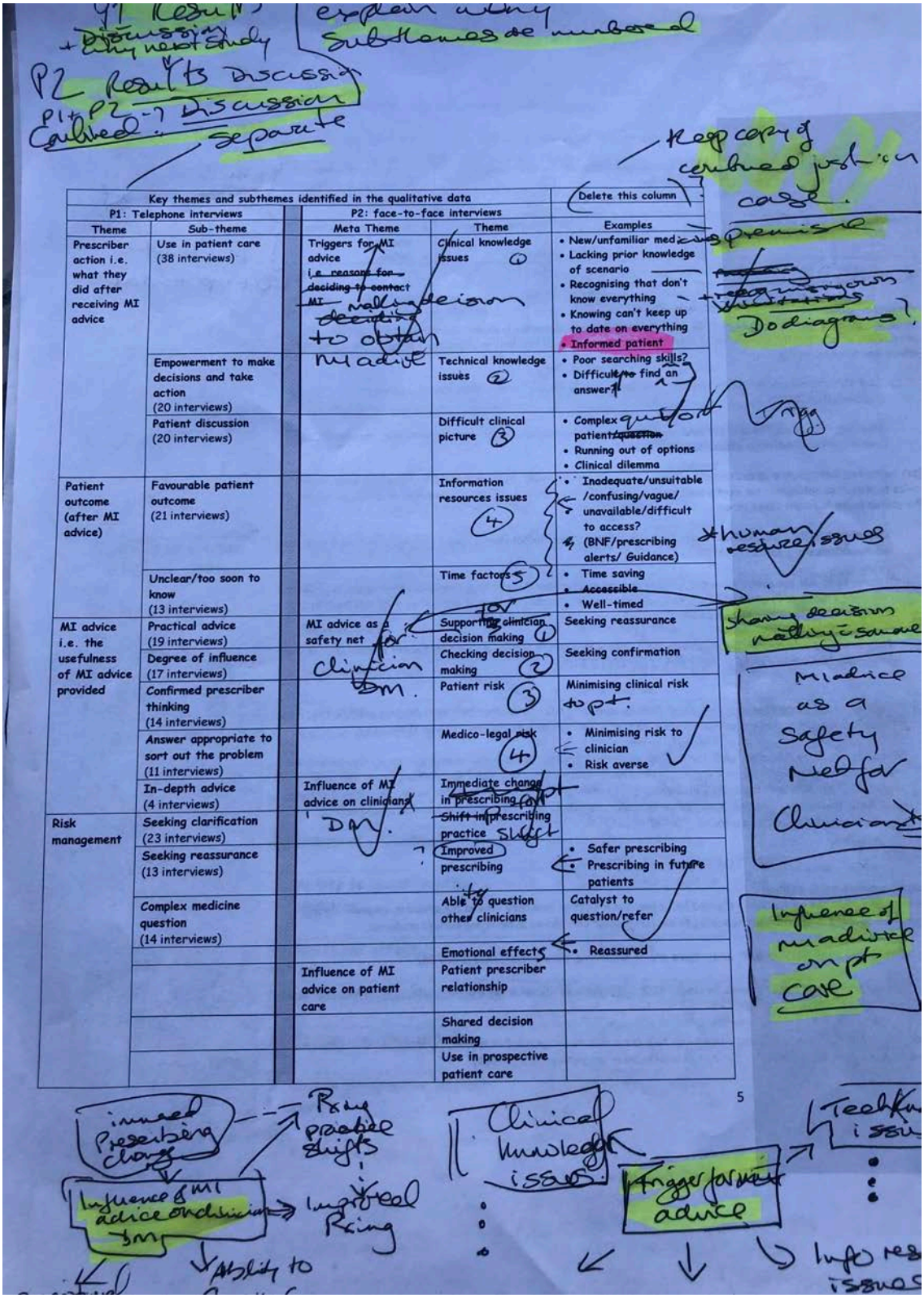
Codes for Face to Face Interviews

Name of code (node)	Sources (Interview transcripts)	Number of references to code
Decision making		
Correct diagnosis	3	4
Future decision making	7	13
Intuition	3	7
Judgement	5	14
Other Specialist Advice	4	8
Patient or carer decision-making	5	10
Place of MI advice in prescriber decision making	15	87
Practicalities of medicine or medical treatment	6	8
Prior knowledge of scenario	13	46
Running out of options	6	16
Safety & Efficacy of medicines (in practice)	11	27
Shared-decision making	12	32
Type of procedure	2	2
Evidence based practice	1	1
Description of EBM	11	17
Keeping up to date	14	59
Online searching skills	10	21
Postgraduate training	6	9
Practising EBM	11	36
Information sources: other	1	1
Alternative sources of information and advice	15	159
Community pharmacy response	2	2
Opinion of other pharmacy services	6	19

Perception of community dental service by secondary care	1	1
Ref source unhelpful	13	35
MI Advice		
Acts on MI advice	14	34
Clarified available evidence	4	7
Emailed advice	12	21
Immediacy of response	14	43
MI service logs query	3	5
Opinion of MI response	13	37
Passes on MI advice	9	19
Provided answer to unknown question	10	13
Referral to specialist	2	9
Refers back to MI advice	8	22
Signposting	1	1
User friendly answer	7	17
MI as an Information source		
Contacting the MI service	13	33
Prior use of MI service	12	20
Rapport with MI staff	4	6
Refers colleagues to MI service	6	6
Telephone discussion with MI	10	23
Third party enquiry	2	4
MI Training	1	2
Patient care	1	1
Better patient follow-up	5	7
Care of future patients	9	16
Complex patient	13	31
Minimising patient risk	15	57
Patient aware consulting MI	12	29
Patient circumstance	14	44
Patient education	6	14
Patient factors considered	13	40
Patient or carer advice	8	10
Patient outcome	14	43
Patient prescriber relationship	15	66
Patient reassured	12	21
Phoned patient or carer	9	14
Referral of Patients	5	12
Specific patient-centred advice	1	5
Prescriber feelings		
Confirmation when unsure	11	31
Don't know everything	11	43
Isolated or lonely	1	1
Prescriber reassured	11	34

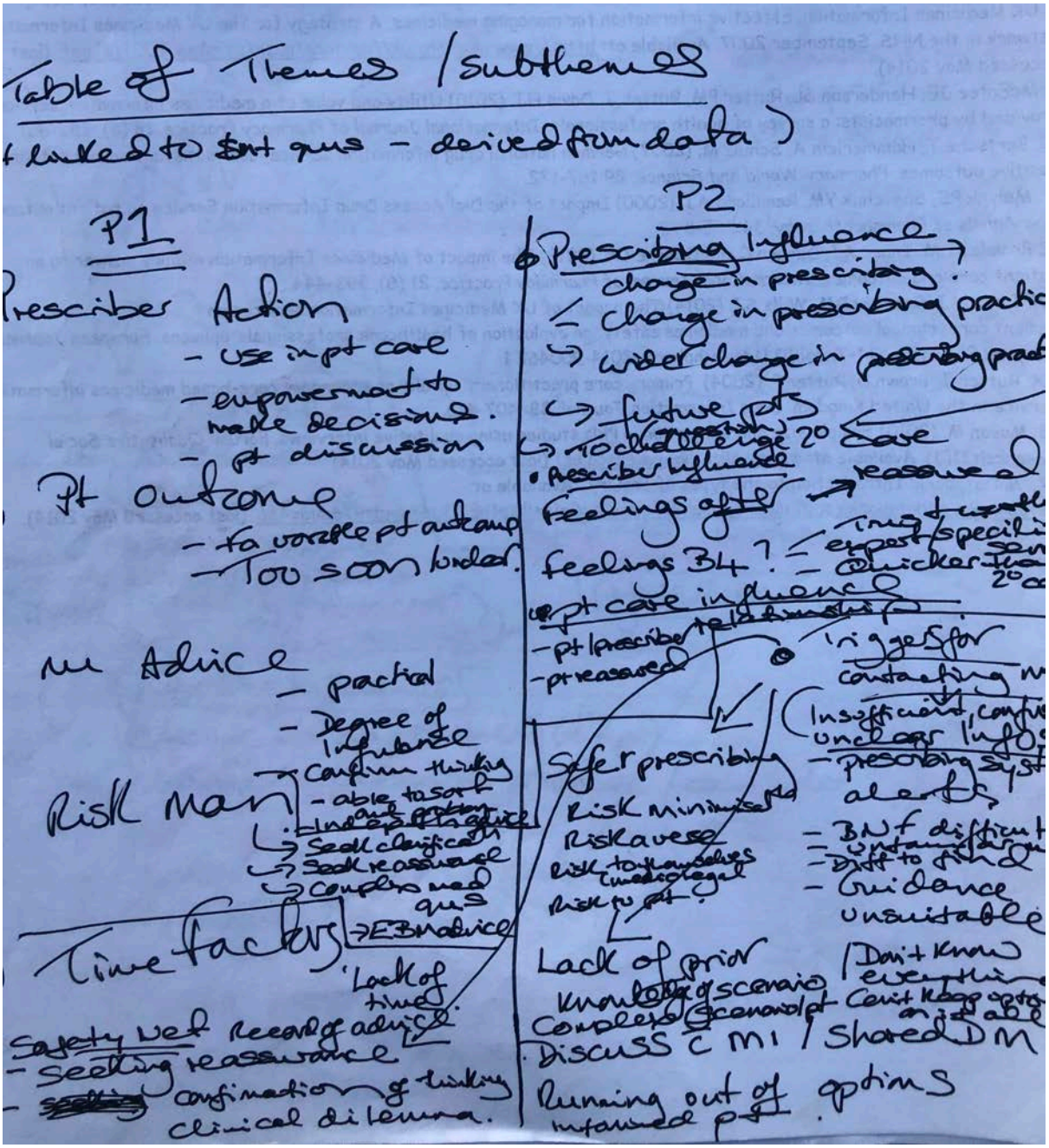
Risk averse	4	12
Risk minimisation	12	42
Seeking reassurance	9	23
Prescribing	1	1
Appropriate prescribing	11	22
Change to prescriber practice	8	28
Factors considered about prescribing medicines	15	44
Not considered risk	1	1
Safe prescribing	12	44
Questioned by others		
Asked a question by another HC professional	2	3
Asked a question by the patient	5	9
View of MI service		
BNF information service	3	6
Enquirer perception of MI	13	31
Evidence based response	11	22
Knowing about the service	12	28
Known MI contact	1	3
Opinion of MI service	14	38
Reasons for using MI service	9	28
Time saved by enquirer	6	15
Unfamiliar medicine(s)	7	21
Unfamiliar patient	3	8
Unsure what to do	12	30
Record of MI advice	6	16
Specialist service	9	26
Trusted service	12	39

Appendix 8b: The process of combining and developing themes across both data sets: telephone and face-to-face interviews



Key themes and subthemes identified in the qualitative data				
P1: Telephone interviews		P2: face-to-face interviews		Delete this column
Theme	Sub-theme	Meta Theme	Theme	Examples
Prescriber action i.e. what they did after receiving MI advice	Use in patient care (38 interviews)	Triggers for MI advice i.e reasons for deciding to contact MI	Clinical knowledge issues ①	• New/unfamiliar med • Lacking prior knowledge of scenario • Recognising that don't know everything • Knowing can't keep up to date on everything • Informed patient
	Empowerment to make decisions and take action (20 interviews)		Technical knowledge issues ②	• Poor searching skills? • Difficult to find an answer?
	Patient discussion (20 interviews)		Difficult clinical picture ③	• Complex patient/question • Running out of options • Clinical dilemma
Patient outcome (after MI advice)	Favourable patient outcome (21 interviews)		Information resources issues ④	• Inadequate/unsuitable /confusing/vague/ unavailable/difficult to access? (BNF/prescribing alerts/ Guidance)
	Unclear/too soon to know (13 interviews)		Time factors ⑤	• Time saving • Accessible • Well-timed
MI advice i.e. the usefulness of MI advice provided	Practical advice (19 interviews)	MI advice as a safety net for clinician	Supporting clinician decision making ①	Seeking reassurance
	Degree of influence (17 interviews)		Checking decision-making ②	Seeking confirmation
	Confirmed prescriber thinking (14 interviews)		Patient risk ③	Minimising clinical risk
	Answer appropriate to sort out the problem (11 interviews)		Medico-legal risk ④	• Minimising risk to clinician • Risk averse
	In-depth advice (4 interviews)	Influence of MI advice on clinicians	Immediate change in prescribing	
Risk management	Seeking clarification (23 interviews)		Shift in prescribing practice	
	Seeking reassurance (13 interviews)		Improved prescribing	• Safer prescribing • Prescribing in future patients
	Complex medicine question (14 interviews)		Able to question other clinicians	Catalyst to question/refer
			Emotional effects ⑤	• Reassured
		Influence of MI advice on patient care	Patient prescriber relationship	
			Shared decision making	
			Use in prospective patient care	

The process of combining and developing themes across both data sets: telephone and face-to-face interviews:



The process of combining and developing themes across both data sets: face-to-face interview theme development

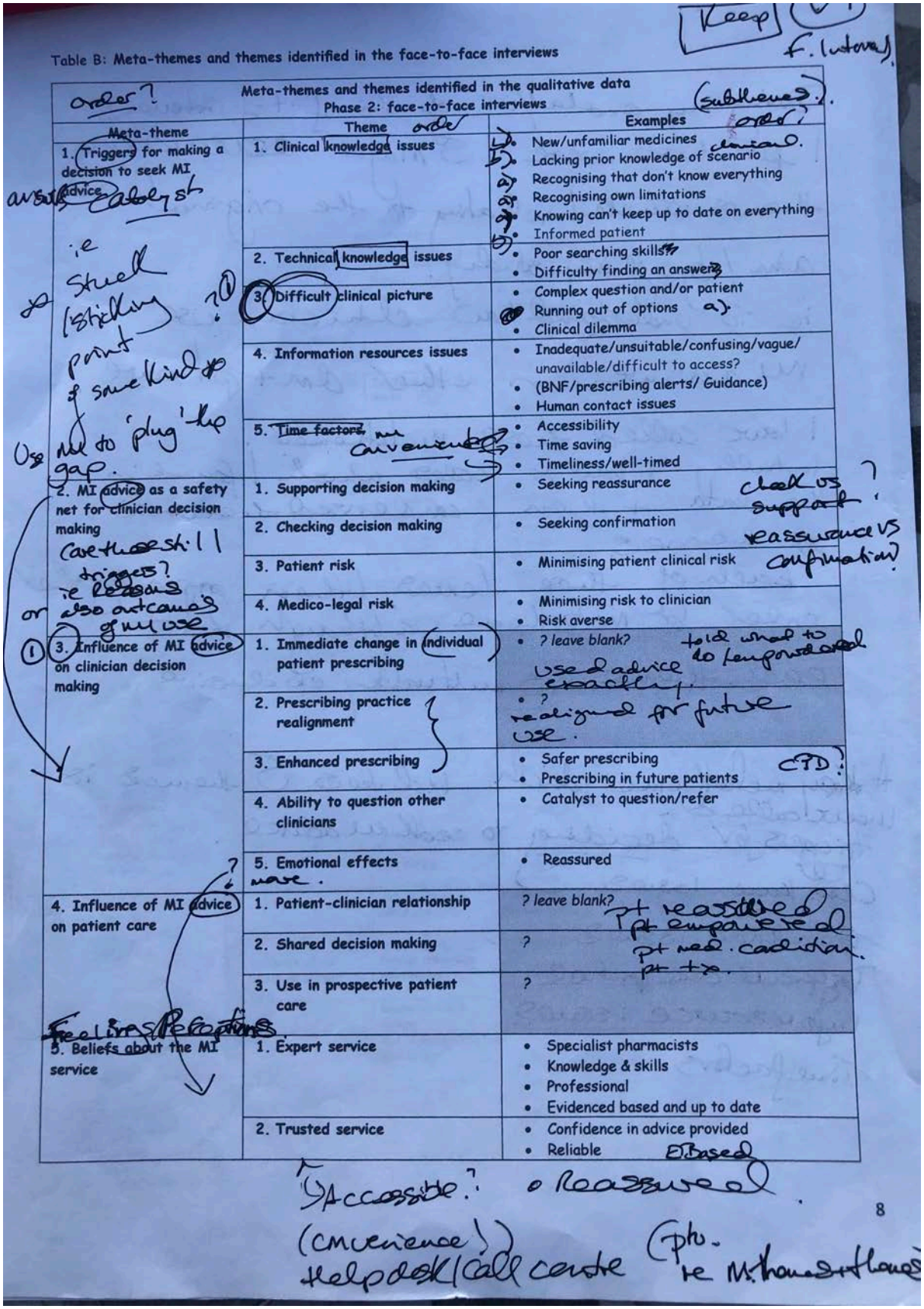
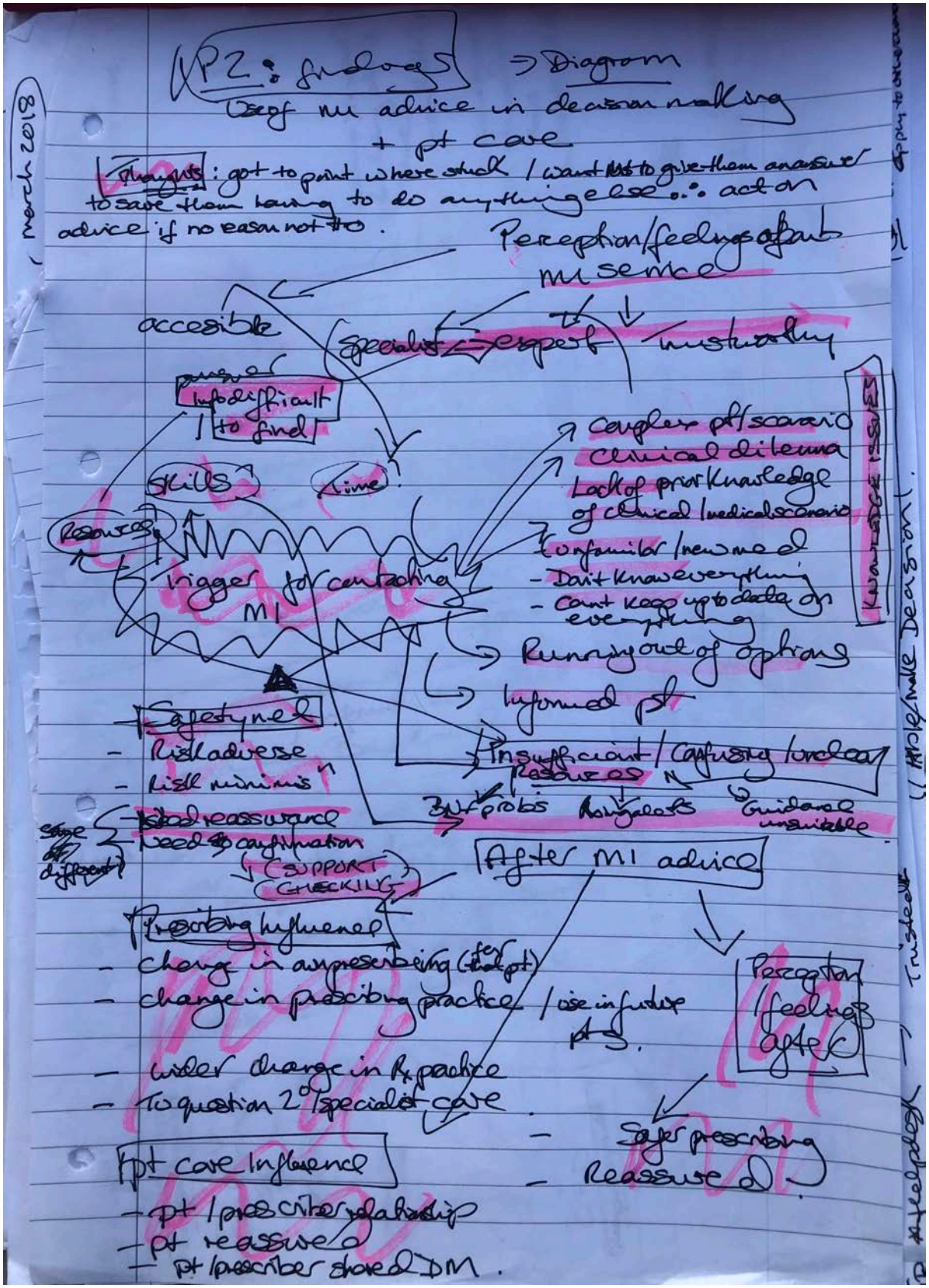


Table B: Meta-themes and themes identified in the face-to-face interviews

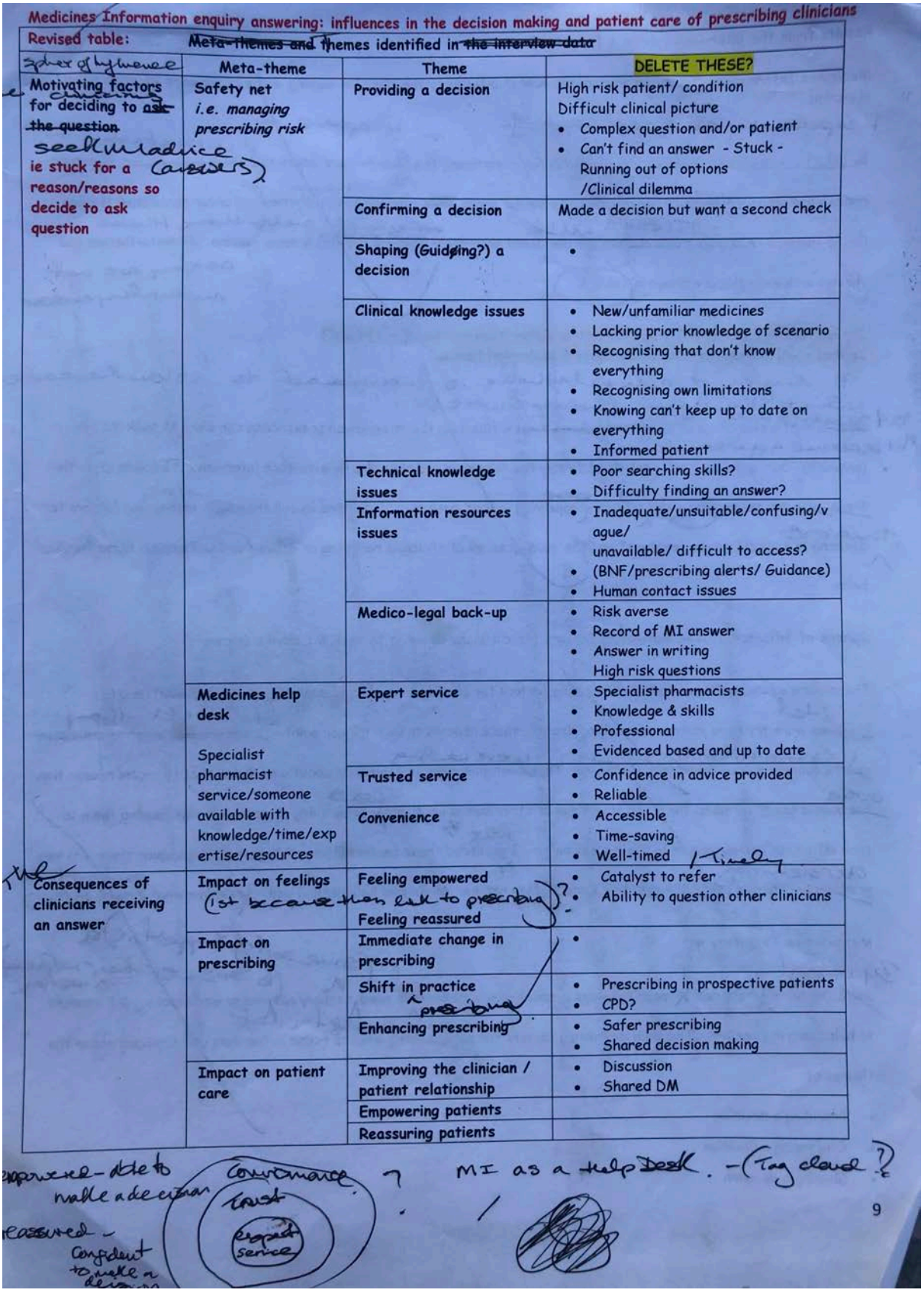
Meta-themes and themes identified in the qualitative data Phase 2: face-to-face interviews		
Meta-theme	**Theme**	**Examples**
1. Triggers for making a decision to seek MI advice	1. Clinical knowledge issues	• New/unfamiliar medicines • Lacking prior knowledge of scenario • Recognising that don't know everything • Recognising own limitations • Knowing can't keep up to date on everything • Informed patient
	2. Technical knowledge issues	• Poor searching skills • Difficulty finding an answer
	3. Difficult clinical picture	• Complex question and/or patient • Running out of options • Clinical dilemma
	4. Information resources issues	• Inadequate/unsuitable/confusing/vague/ unavailable/difficult to access? • (BNF/prescribing alerts/ Guidance) • Human contact issues
	5. ~~Time factors~~ convenience	• Accessibility • Time saving • Timeliness/well-timed
2. MI advice as a safety net for clinician decision making	1. Supporting decision making	• Seeking reassurance
	2. Checking decision making	• Seeking confirmation
	3. Patient risk	• Minimising patient clinical risk
	4. Medico-legal risk	• Minimising risk to clinician • Risk averse
3. Influence of MI advice on clinician decision making	1. Immediate change in individual patient prescribing	• ? leave blank?
	2. Prescribing practice realignment	• ?
	3. Enhanced prescribing	• Safer prescribing • Prescribing in future patients
	4. Ability to question other clinicians	• Catalyst to question/refer
	5. Emotional effects	• Reassured
4. Influence of MI advice on patient care	1. Patient-clinician relationship	? leave blank?
	2. Shared decision making	?
	3. Use in prospective patient care	?
5. Beliefs about the MI service	1. Expert service	• Specialist pharmacists • Knowledge & skills • Professional • Evidenced based and up to date
	2. Trusted service	• Confidence in advice provided • Reliable

8

The process of combining and developing themes across both data sets: a mind-map of initial findings (face-to-face interviews)



The process of combining and developing themes and meta-themes (telephone and face-to-face interviews)



Medicines Information enquiry answering: influences in the decision making and patient care of prescribing clinicians

Revised table: ~~Meta-themes and~~ themes identified in ~~the interview data~~

Sphere of influence	Meta-theme	Theme	DELETE THESE?
Motivating factors for deciding to ~~ask the question~~ seek advice ie stuck for a reason/reasons so decide to ask question	Safety net *i.e. managing prescribing risk*	Providing a decision	High risk patient/ condition Difficult clinical picture • Complex question and/or patient • Can't find an answer - Stuck - Running out of options /Clinical dilemma
		Confirming a decision	Made a decision but want a second check
		Shaping (Guiding?) a decision	•
		Clinical knowledge issues	• New/unfamiliar medicines • Lacking prior knowledge of scenario • Recognising that don't know everything • Recognising own limitations • Knowing can't keep up to date on everything • Informed patient
		Technical knowledge issues	• Poor searching skills? • Difficulty finding an answer?
		Information resources issues	• Inadequate/unsuitable/confusing/vague/ unavailable/ difficult to access? • (BNF/prescribing alerts/ Guidance) • Human contact issues
		Medico-legal back-up	• Risk averse • Record of MI answer • Answer in writing High risk questions
	Medicines help desk Specialist pharmacist service/someone available with knowledge/time/expertise/resources	Expert service	• Specialist pharmacists • Knowledge & skills • Professional • Evidenced based and up to date
		Trusted service	• Confidence in advice provided • Reliable
		Convenience	• Accessible • Time-saving • Well-timed / Timely
Consequences of clinicians receiving an answer	Impact on feelings (1st because then talk to prescribing)?	Feeling empowered	• Catalyst to refer • Ability to question other clinicians
		Feeling reassured	
	Impact on prescribing	Immediate change in prescribing	•
		Shift in practice	• Prescribing in prospective patients • CPD?
		Enhancing prescribing	• Safer prescribing • Shared decision making
	Impact on patient care	Improving the clinician / patient relationship	• Discussion • Shared DM
		Empowering patients	
		Reassuring patients	

empowered - able to make a decision

reassured - confident to make a decision

Governance ? Trust Expert service

MI as a help desk. - (Tag cloud ?)

9

Appendix 8c: Transcription extract of a face-to-face interview with coding

Note: Codes have been deleted to only show the coding (codes with stripes) relevant to this transcript.

However, some codes are still visible due to formatting issues, as deleting these would have deleted codes I wanted to show in this document

TOPIRAMATE & INTERACTION WITH ST JOHN'S WORT

JR: Yeah. So yeah, so if we can move onto, if you want to ask me at the end anything about the service. So you asked us about St John's Wort and Topiramate, and I don't know if you can describe what happened, if you can remember anything about the incident …?

I: I think, I've not had further clinical encounter with the same

patient afterwards … JR: No

I: … but I remember when I spoke to you and I think it was looked into through your manuals and you got back to me saying … just recall…

JR: It's a long

time ago, isn't

it? I: Mmm

JR: But actually Topiramate, there's theoretical information about it …

I: Yeah

JR: … about St John's Wort decreasing Topiramate levels

… I: Yes there was …

JR: Yeah

I: … yeah …

JR: … but that was all, so … I:

… that's true

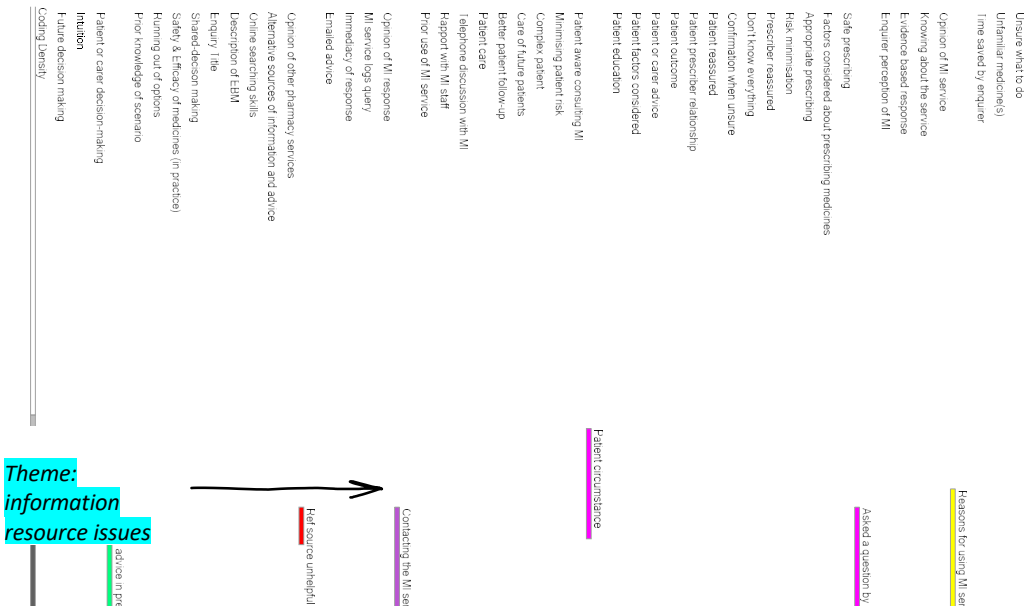
JR: … I don't know what, the pharmacist that did the query has written a little bit on the enquiry, 'cause we record them all electronically and she put something about, it sounded like you were talking to the patient at the time …

I: That's true … JR: … yeah, so …

I: … yeah, I think what we did is, because I think her headaches were getting worse …

JR: Yeah

I: … she was advised to carry on taking Topiramate, now they were present in the consultation when she asked this question, it was quite a lengthy consultation, she asked quite a few questions and in the end asked this as well, so I thought *rather than*, because I looked through the BNF straightaway and I couldn't find any potential interaction there …



J R: No
I: … then I think I had your number handy as well, so …
J R: Right

I: … the information advice line, so I rang in on the speaker there and then and spoke to your people…

JR: Yeah

I: … and I've actually put the speaker on …

JR: Oh OK, yeah …

I: … so they …

JR: … sometimes that's a good idea…

I: … could hear it …

I: … and they were actually quite impressed, pleased with the service…
JR: … yeah

JR: Right

I: … and the fact that they found out straightaway there and then

JR: M-mmm …

I: … em …
JR: … what, the patient themselves …
I: … the patient,

yeah

JR: … right, OK

I: It is quite useful for me as well, it saved my time as well…

JR: Yeah

sense, it was done …

JR: Doing it at the time …

I: … there and then …

JR: … rather than …

I: … yeah …

JR: … by email

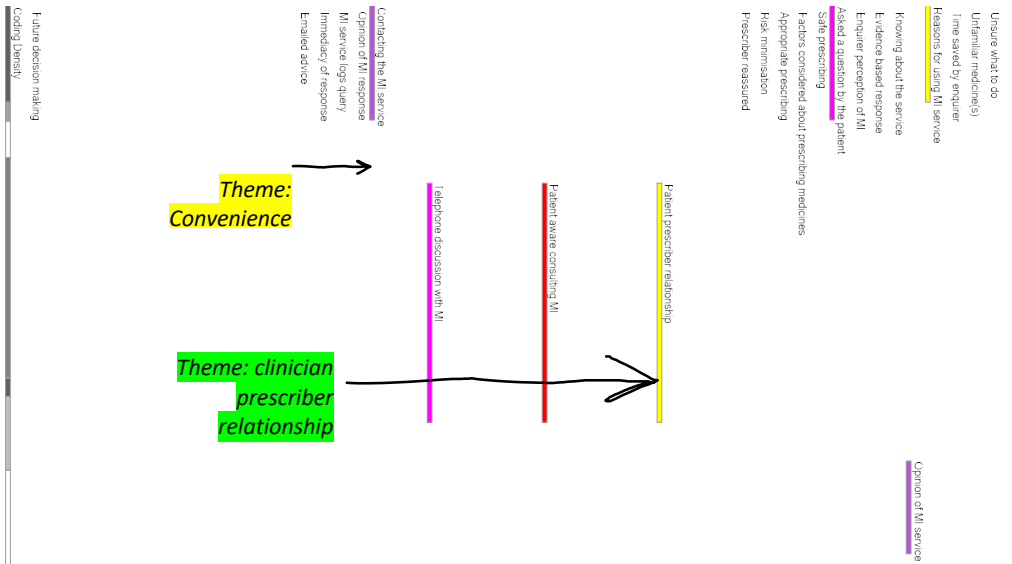
I: … during the consultation

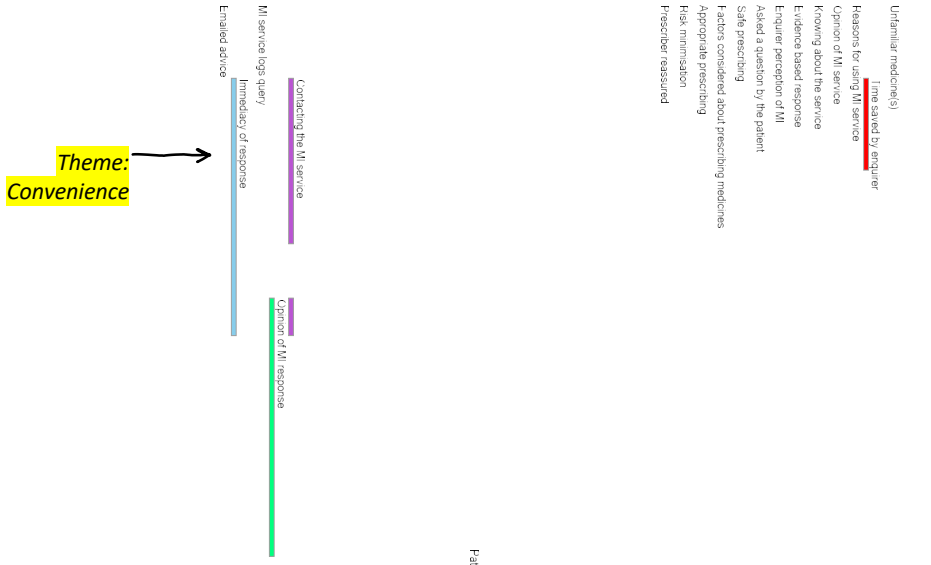
JR: Yeah. So did the patient, I don't know if you can remember, was the patient already on St John's Wort, or were they just thinking about taking it?

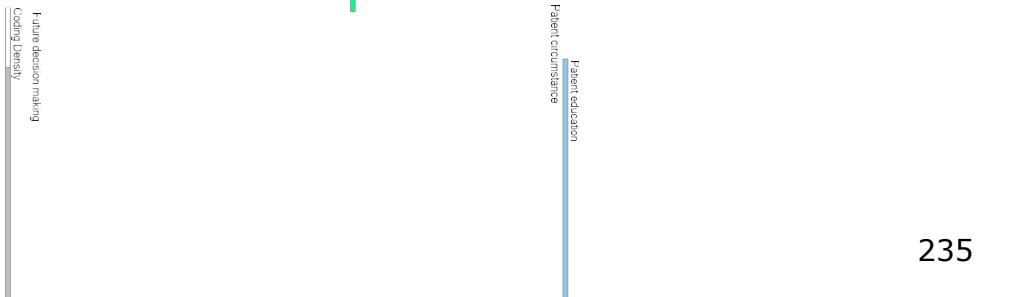
I: I think they were already on St John's Wort, they were taking on and off

J R: Right

switched to Amitriptyline …







JR: Yeah

I: … and which wasn't effective and at that stage they were asked to go onto Propranolol, sorry Topiramate …

JR: Yeah

I: … and I think it was her husband who looked on Internet somehow …

JR: Right, OK

I: … and he found out somehow, I don't entirely remember …

JR: No, yeah

I: … but it was actually the husband who brought it

up … JR: Oh OK

I: … and asked me the question

… JR: Right

I: … and then …

JR: And he was there as well

… I: He was there …

JR: Right …

I: … as well …

JR: … yeah

I: … and then the wife said "oh yeah, you talked to me before," so they threw that question onto me and I obviously didn't know the answer [slight laugh]

JR: No [slight laugh]

I: … yeah, so it was useful

JR: Yeah. So where did you look then when you initially were asked that question?

I: Yeah. I mean the first portal is obviously BNF, we look to that. I tend to use electronic BNF a lot more. I don't use the paper copy of it, down the list and see

it … JR: Yeah

I: … and if I find the information there that's good enough for me, if not then *normally* if, if flexible sometimes like an out-of-hours, evenings or late, Friday afternoon I've got a very close pharmacist

friend … JR: Right

I: … so I must say that, I mean he is working most of the time…

JR: Yeah

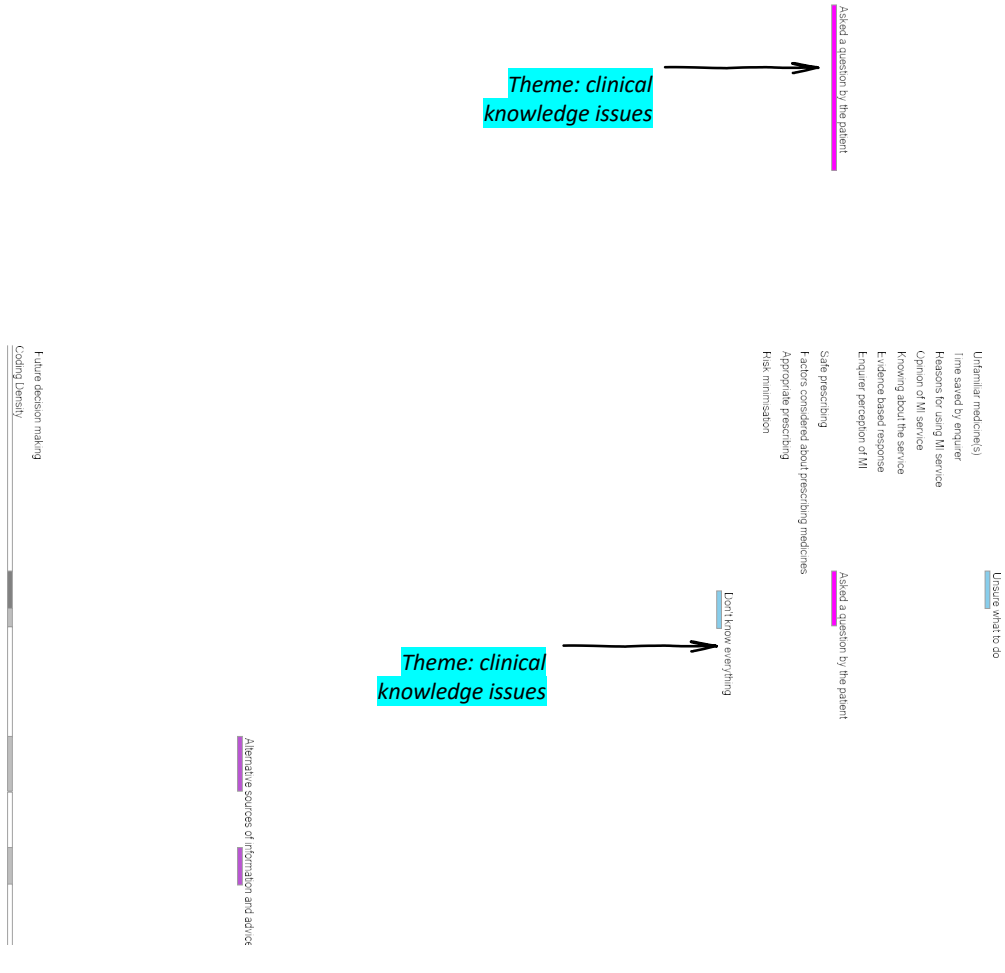
I: …sometimes I informally send him a message as well, if it's like a non-urgent type query …
JR: Yeah

I: … and ask him …

JR: OK

Theme: clinical knowledge issues

Theme: clinical knowledge issues



use different portals?], I mean as you know Dr [?] is one of the partners here …

JR: Yeah

I: …many times if we've got a query, we can't deal with people look at the BNF first, some people look at MIMS first …

I: … if they can't find the answer then there's no standard protocol …
JR: Yeah

JR: No

I: … where they're going to go next, some people have just a little bit more experience, they deal with it, sometimes they make it as like a different query, ask the patient to go home and check it. Some people ring in, we've got an in-house pharmacy

here … JR: Yeah

I: … there's a pharmacist here …
JR: Yeah

I: … but obviously it depends, at one time there are one or two pharmacists, it's quite a big pharmacy here, sometimes as well and obviously it depends [on?] their clinical experience as well, what background they've got, what clinical confidence they've got, so
sometimes we do get an answer, other times we don't, so that's what I used to do before as well …

JR: OK I:

JR: No

I: … obviously he's more experienced than me, he probably knows the answer to

everything … JR: Right [slight laugh] …

I: … [?] …

JR: … I don't think anyone knows the answer to everythin

I: … no, so he probably ring in as well to this local pharmacy, if they can't get answers then people looked around MIMS, I don't know what they do afterwards

… JR: Right …

I: … yeah …

JR: … OK, is there anywhere else you look on the Internet at all after BNF, or …?

I: I think I tend, there is a website, I've got that on my own desktop … I've got a bookmark made … I don't know off the top off my head, it's quite a large medication database …

JR: OK

I: … I'll just see if I can bring it up here

JR: Do you use NHS Evidence at all? Is that one you

use? I: Do you mean things like …

JR: The NICE Evidence search or NHS Evidence it's called? I wonder if that might be what you meant

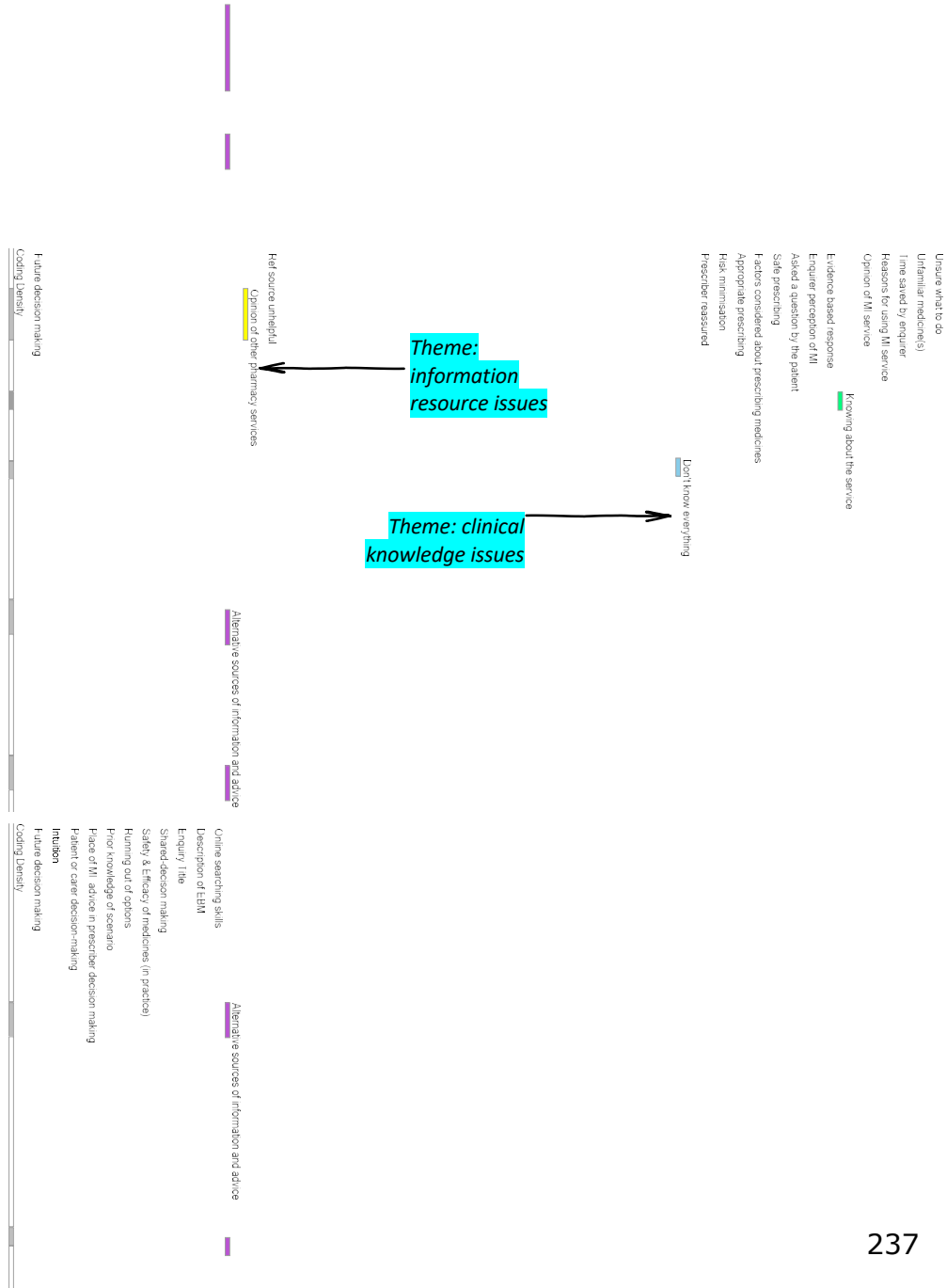
I: I think, yes of course we do, use it for guidelines and things quite a lot, I use Patient Summaries, I use NICE, I use the Website, we use GP Notebook …

JR: Yeah

I: … I don't know if you're aware that

that's … JR: I've heard of it …

I: … good as well?
JR: … I've never seen it,



yeah I:

JR: Yeah

I: … emm …

JR: Do you Google?

I: I Google as well …

JR: Yeah

I: … to be honest …

JR: We all do, yeah

I: … it depends what sort of a link it comes out with, I may or may not take advice, I may not take it as definite but I do Google, so Google, BNF, GP Notebook, NICE and it's called the Patient Summaries, I don't know if you've heard of that?

JR: Right

I: And it's just clinic, what's the word

… JR: Clinical knowledge summary?

I: Clinical knowledge … JR: Yeah …

I: … CKS, yeah

JR: … it used to be Prodigy … I: …

clinical know, yeah …

JR: … yeah we use …

I: … so that's that one …

JR: M-mmmI: … so we use them. There is another thing in this Website …

JR: Oh yeah Medicine's CompleteI: … [?] …

JR: … yeah

I: … so when you put in here, so you can look into other publications as well, eh …

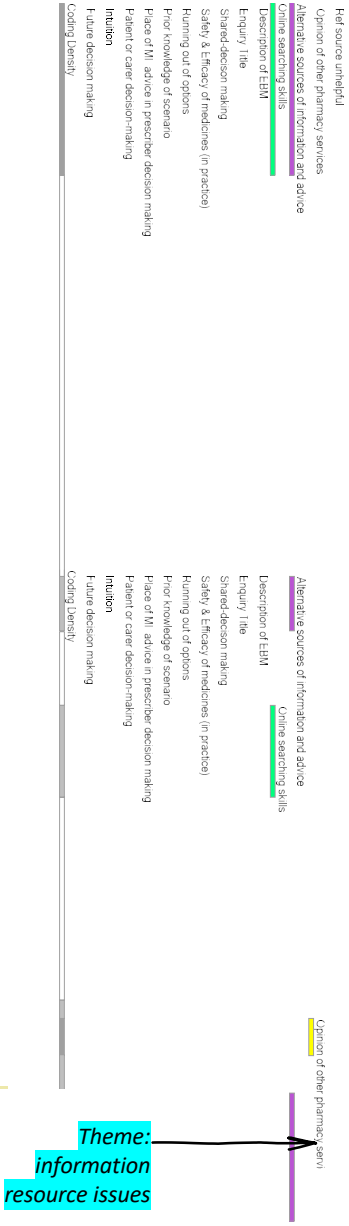
JR: Depends on what you've got subscription … so does this organisation subscribe to it then, or is it …?

JR: 'Cause the problem with searching in the main search box is we always think *you don't know what you're going to go to* do you …

I: Yeah
JR: … we would always go into the particular resource we wanted on MedicinesComplete
I: Yeah
JR: Yeah, OK

I: So if we can't get through, obviously people are looking online on these portals first and if they can't get enough information then I ring the local pharmacist. I think, I must say our pharmacist, one or two of them have been working here for a period of time they're quite good, very helpful, they take details …

I: … and feedback to us later on, it may not be the same day, it may be the next day depending how busy they are…
JR: Yeah



JR: Yeah, get someone else, OK. So if we just go back to the case, and just talk a bit about the actual case that, when you contacted us about St John's Wort …

I: Mmm

JR: … so when you, you've maybe explained it already, how you used our advice, so the patient was there, the patient and her husband were there with you.

I: Yeah

JR: Yeah

I: I think …

JR: I just want you to describe to me more what happened, 'cause this is

qualitative, so … I: Yeah

JR: … what happened and how you felt about it after you got our advice as well

really

I: I think it was just …

JR: These are just prompts for me on

here

I: OK

JR: Yeah

I: It was very useful to have, to know at the back of the mind that there is a sort of a qualified expert pharmacy service is there to advise you, I was able to get into that straightaway, and they took my details, they looked through, gave me advice and it was first-hand information there and then I passed it on …

JR: Yeah

I: … to the patient. I knew it was reliable evidence-based information, it was safe, so I'm, I mean I felt quite confident as well. And in fact to an extent that when I knew I was talking to another professional, and then I actually turned the speaker on and they could hear it as well …

JR: Yeah [?], OK yeah. So at what point, I'm trying to get into peoples' heads about at what point makes you decide *oh I don't know what to do next, I need to phone, I need to contact … this service*, so thinking …

I: Yeah

JR: … about maybe that case and other times that you've used the service, at what *point* …

I: Yeah

JR: … in your thinking process, or in the consultation, does it, do you decide to contact the service?

I: I think the practical bits of interaction when we come across in day-to-day things, sometimes things are very straight few things are written or documented, part of the BNF written guidance, most of them we do find is fine …

JR: Yeah

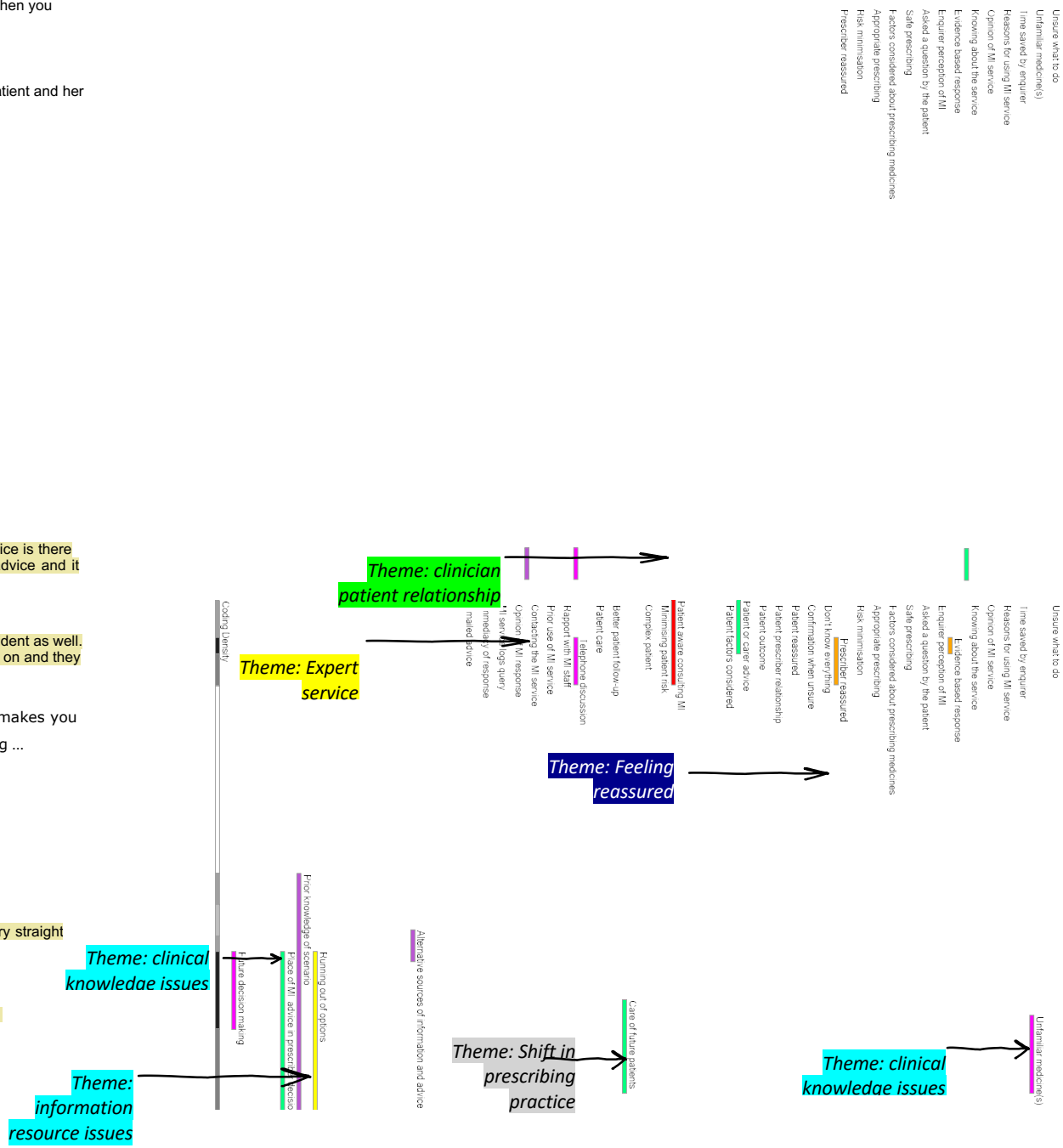
I: … if you can't find it, if you've got previous experience of it, like I know about Topiramate and St John's Wort now…

JR: Mmm

I: … so we utilise it, but if we don't and it's not written information, something new comes across …

JR: Yeah

I: … I think at that stage we think we need some advice and …



JR: OK …

I: … we'll get hold of you girls?

JR: … so if it's something you're not

familiar … I: Yeah

JR: … familiar with, OK. You've already said what happened with the patient … did she decide to continue with the St John's Wort, you're not sure what happened with …?

I: I think they stopped it …

JR: Right

I: … as far as I remember …

JR: Yeah

I: … based on the advice they were given

JR: OK

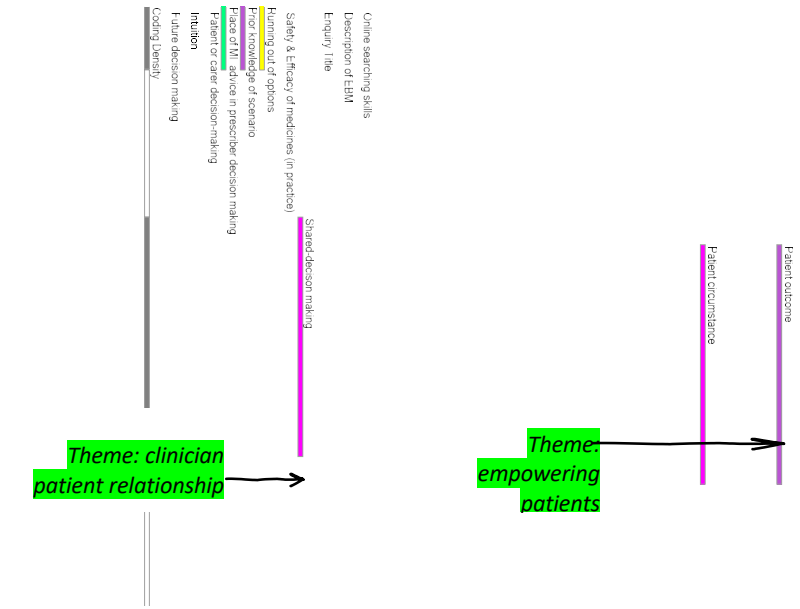
I: Because it was more important for them at that moment in time to treat the migraine than to start the new medication…

JR: Yeah

I: … so they stopped it

JR: OK. Right so if you hadn't, you've maybe talked about some of this already but just in case there's anything else you've not mentioned, is if you hadn't called Medicines Information for advice, what would you have done then, how else would you have sorted the problem out?

I: I think somehow I could have still got the information …



JR: Yeah

of that list for me as well …

JR: Mmm

I: … you just write it down, at the end of the surgery you would look in to it, either ask a senior colleague, ask a local pharmacist, a friend, Google it, different portals …

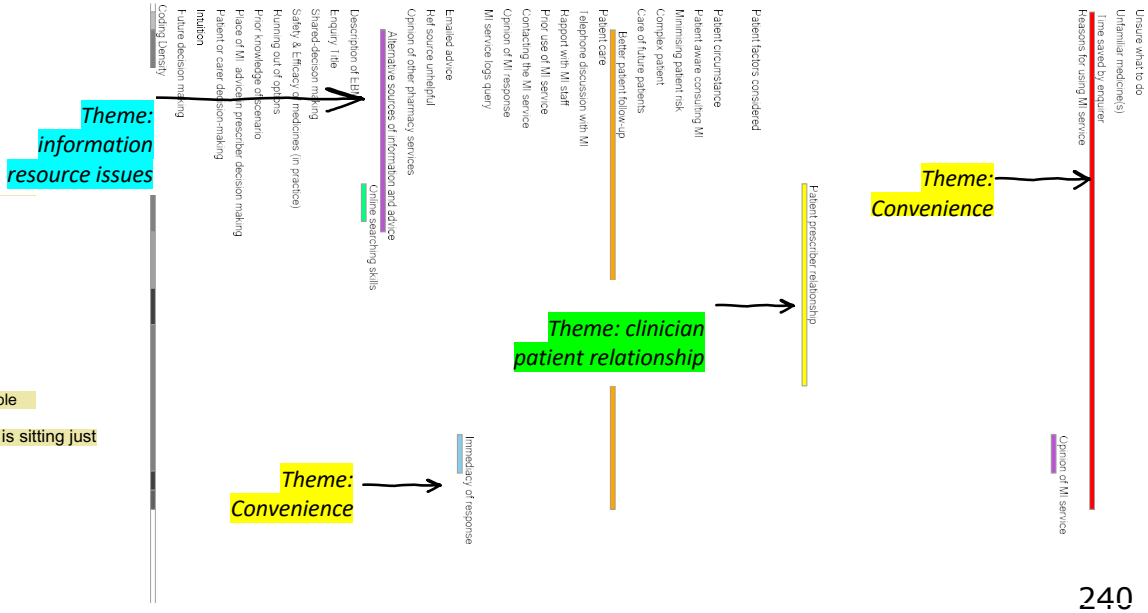
JR: OK

I: … and find out then ring back the patient …

JR: Yeah

I: … or book a follow-up appointment and talk to them. Other things, somehow I will find the answer but they you wait, yeah, the people have to wait for it. I think with this service is that it, it's more like a *live helpdesk* sort of a situation thing, where somebody is sitting just ring them and they'll look into it straightaway and get back in to us

JR: OK, yeah. I try not to say too much because obviously it's for you to talk to me really, so that's fine, that's great. So what about, when I've done some other interviews, I have done some phone interviews as well as doing these face-to-face ones, the phone interviews, some of the things that came up was about using Medicines Information advice to minimise risk to themselves and/or patients …



I: Mmm

JR: … I just wonder if you've got anything, what do you think about that?

I: I think yeah, certainly it's one of the big advantages as well, I mean as you would know with the current atmosphere and the way the litigation side of things as well, and obviously in terms of the patient perspective, they want to know more and more, and the patients know a lot more as well these days …

JR: Yeah

I: … they want to be absolutely and we want to be very safe in our prescribing as well, but we're actually in a practice where we have a very good safe prescribing record, so it gives a lot more confidence when you're giving a prescription or prescribing or advising something …

JR: Mmm

I: … if you find the advice, I mean the BNF as you know is like a bible sort of thing, as most of the things are blind trust in, pass it on, but if we don't then rather than taking an educated guess and then taking a risk sort of thing and not being very sure, I think it's always a good idea, you feel a lot more confident as well …

JR: Right

I: … safe as well …

JR: OK

I: … to find that information, and often we do document as well, I mean I've started document …

JR: You document it in?…

JR: M-mmm

I: … so it becomes for audit purposes as well, for clinical awareness purposes that we do know who we're taking advice from …

JR: Yeah

I: … so that information is auditable

JR: OK, yeah. And when we've sent you, have we sent you emails and things before now as well?

I: Yeah

JR: Yeah

I: Yeah, I mean I've received a few emails, there were, two or three of the main enquiries I've recently asked, one was … it was to do with Creons …

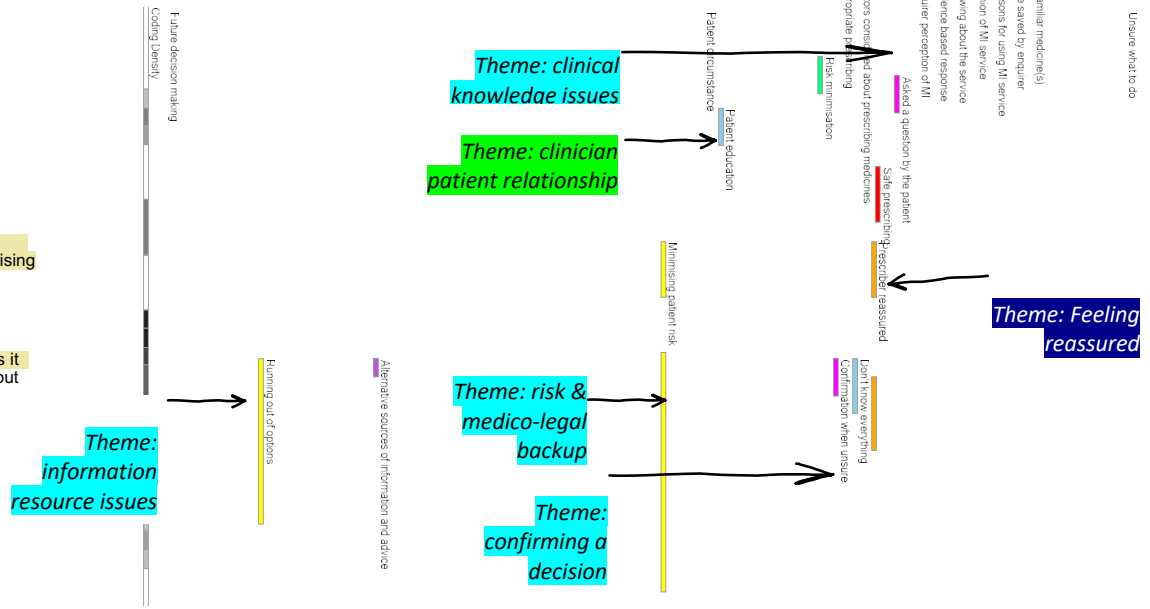
JR: Right, OK

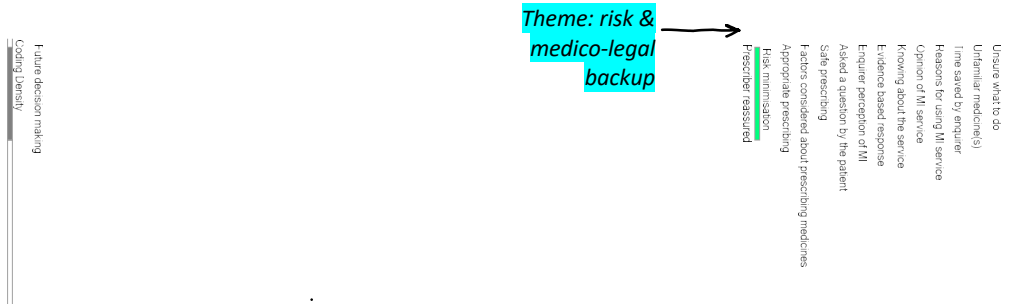
I: … and, I don't know if it was yourself or one of your colleagues … JR: I don't think it would …

I: … I'm not sure …

JR: … yeah I'm part-time, so quite often it's not me … I: Yeah

JR: … you you're alright [slight laugh], and it's all confidential anyway, but I haven't looked at what you'd asked more recently 'cause …





I: Yeah

JR: … I wanted you to tell me

I: I've actually been using it quite frequently,

your … JR: Yeah

I: … service

JR: Well, yeah that's fine, that's what we're

there for I: So that's true an it's a very handy tool in that sense, to have the confidence that we are prescribing safe and giving them advice which is actually evidence-based, is …

JR: Yeah

I: … it's being given by a qualified pharmacist

JR: OK, so yeah, so it's kinda of getting to the point of, obviously you've never met us before and we're on the phone, how do you, what is your perception of the service, how does it give you confidence, that's something that's …?

I: Yeah I think we were told firstly, somehow the information got into the Practice Manager I think …

JR: Right, OK

I: … and we were told that this information advice line is available. We also have got, actually a clinical pharmacist works in our practice …

JR: Yeah

I: prescribing, cost-effectiveness, efficacy and all that, some people go and take advice from them as

well … JR: Mmm

I: … speak to them. So that's how we got the information, and since then, I mean I've been using it, I find it …

JR: Mmm

I: … sorry if I've …

JR: No, no …

I: … forgotten …

JR: … no, no it's fine …

I: … to answer the question.

JR: … no it's quite difficult to ask you the right question to kind of get you to tell me a bit more about it, I'm trying to work out what prompts people to phone the service and how you feel about it, in terms of … the fact that you're saying that …

I: Yeah

JR: … we're qualified pharmacists and…

I: Yeah

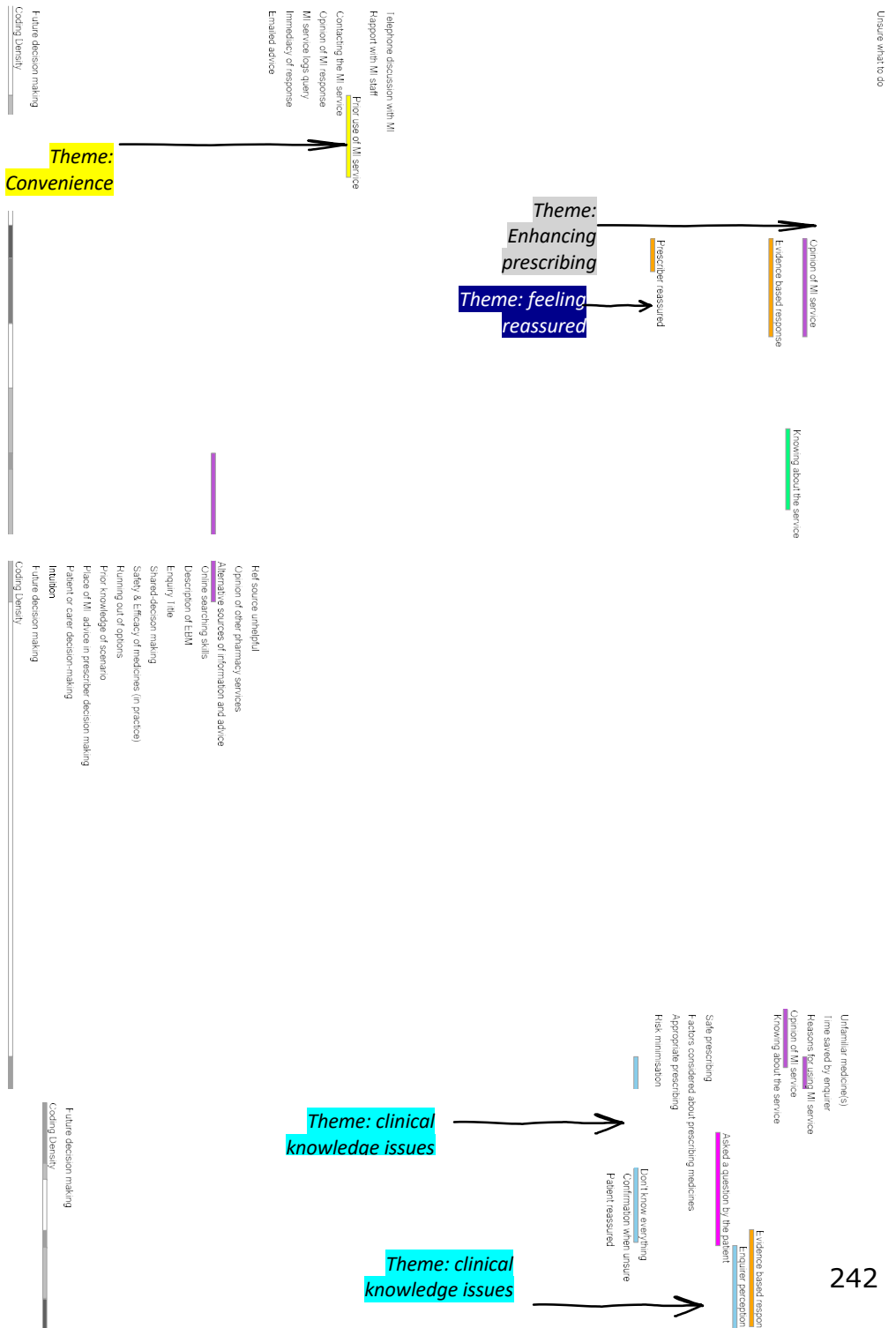
JR: … maybe we, it's slightly different than using the community

pharmacist

I: Yeah I think we feel quite supported

JR: Yeah

I: but that is actually not true



… JR: [slight laugh]

I: … we've got limitations, we are asked so many, a ton of questions every single day …

JR: Yeah

I: … and more and more people are coming in, and they do a lot of their homework, they know about medications, they're looking at

different things, they bring in actually print-outs from the paper cutting, newspapers, from all different components and things a lot more, so it's not easy to know everything. In the past we used to take it from them, take the information and go back and often we were looking at different portals, but not obviously, I mean you being a pharmacist and you being part of the service as well, you're probably aware of a lot more websites and databases where you can get evidence-based first hand appropriate information there and then straightaway, so I think that that gives a lot of confidence to us as well, that this information which has come out is not just from Google or anything, cos of course people like yourself, you're part of this PhD course and, so the information we've got is from a qualified pharmacist who are looking into the appropriate Website and databases. I think for me personally that, that gives me a lot more confidence …

JR: OK

I: … 'cause I may take information and we go back and do homework, but we're probably looking at the Websites which give, which are a lot more clinical-orientate …

JR: Mmm, m-mmm

I: … not pharmacologically-orientated …

JR: OK …

I: … so

JR: … yeah, OK. So practising evidence-based medicine, we've probably talked about sources of evidence-based medicine that you use, but what does evidence-based medicine mean to you?

I: I think anything we advise, prescribe, we give information, is appropriate, is looked into, has got research-backing, is recommended for that person, for that indication, is appropriate, safe and advisable, I mean that's what …I'm conscious of the time

JR: M-mmm, OK. A few other questions just to ask you … I think maybe, when I've done other interviews it's been mentioned about practical advice that we give, you've mentioned that it's timely because you can get an answer more or less straightaway, but …

I: Yeah

JR: … have you got anything to say about it from a practical point of view, or is that not something you've really, it depends on the questions you've asked, it might not really have come up? Say when we've emailed you with information has it, how has it been in terms of telling you what to do?

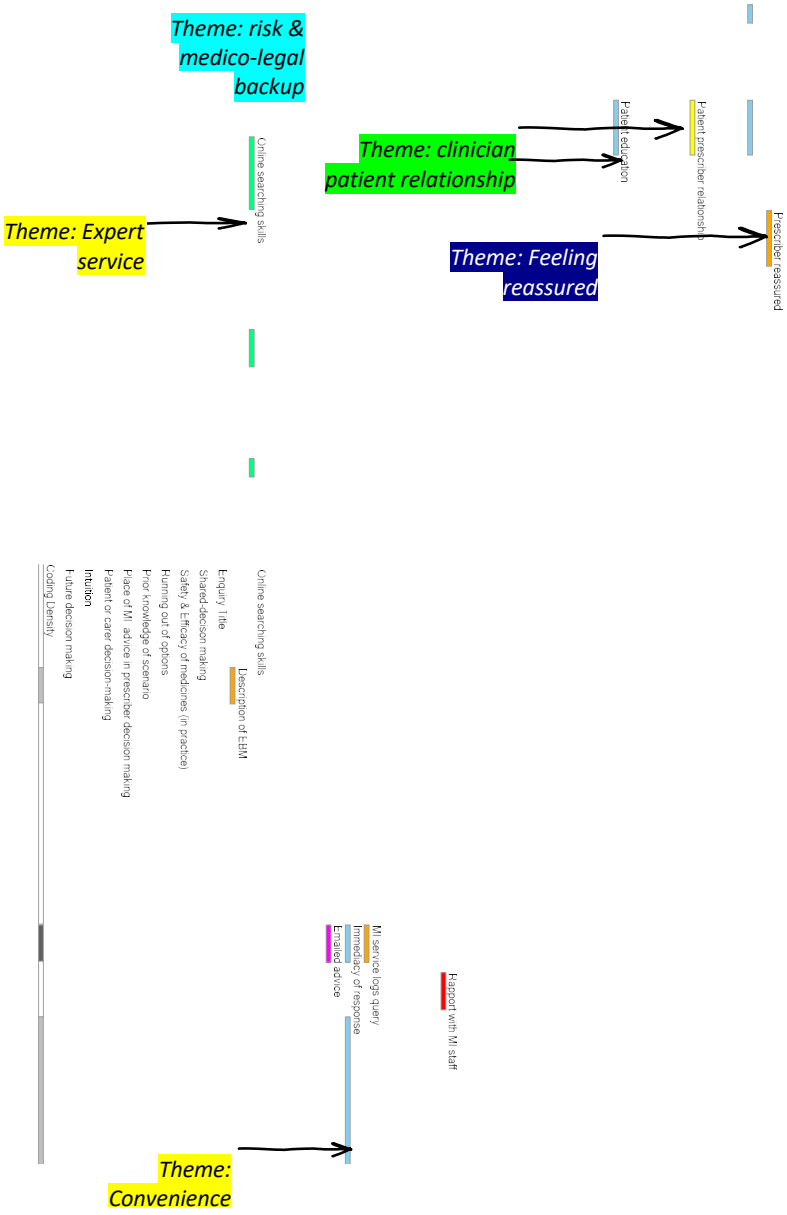
I: I think it's quite good, I was given, on numerous occasions, I was given this option twice when I rang, and I was asked that, *is that something I would like to know now or will they take my email address and get back to me later on?*

JR: OK

I: I think on a couple of occasions because it wasn't something I wanted to know straightaway there and then, 'cause somebody asked me just not long ago, if the Creons they take for their chronic pancreatitis, because they're very like strict vegetarian, for religious reason they won't take sort of like any pork gelatine in it …

JR: Yeah

I: … so there was no urgency for that, I said …



JR: No

I: … "OK if you can look into it then get back to me later on" JR: M-mmm

I: Similarly the situation with some vitamin D preparation, I didn't need to know there and then and I said "OK fine, you can take my email address and let me know later on"

JR: Yeah

I: But on this occasion Topiramate, St John's Wort, I think I, they got back to me straightaway there and then, so I think it was dealt with appropriately according to the urgency …

JR: Yeah

I: … of the situation, one needed to know …

JR: M-mmm

I: … the person on the other end of the phone they sort of sensed it quite appropriately then got back to me. JR: Yeah …

I: … if they needed to.

JR: … I guess if they knew the patient was there …

I: Yeah

JR: … yeah. So how do you make, forget about our service, but how do you tend to make decisions about medicines, about prescribing them, how does it fit in your clinical decision-making thought processes? These questions get harder as … [slight laugh]…

I: Ooh … [slight pause] … obviously we are driven mainly by the clinical indication. Patient choices, the past history, there are numerous factors and I think there are, there were like a longs what all GPs would do for that condition, which is pretty much standardised, but slight variation in terms of … it's a very quick sort of, you can say like a browsing in the head we have to go through, looking at someone while they're sitting there looking at their history, looking at the condition, so many things just pass through and we scan them literally, and we say "OK that seems like the appropriate thing for that person," and we prescribe it …

JR: Right

I: … so many things

JR: And how do you think that happens, that process, is that…?

I: I think it happens naturally …

JR: Mmm

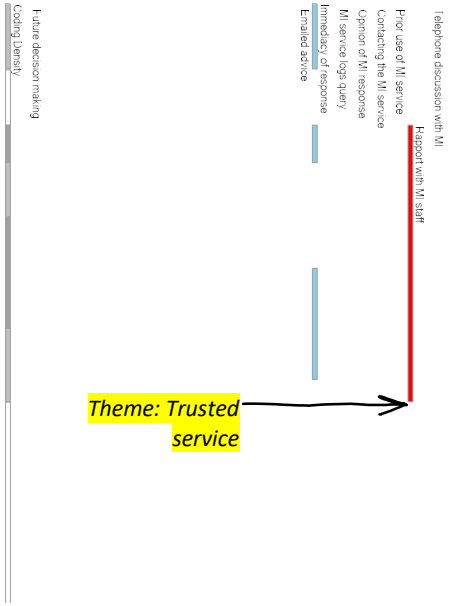
I: … yeah sometimes we just don't have a control on it …

JR: No

I: … because you've done something so many times …

JR: Yeah

JR: … OK, all right



I: It's like a second reflex, so you just do it

JR: Yeah, OK, so are you kind of ruling out certain things and then … I: Mmm

JR: … moving onto … OK, and how does the Medicines Information advice fit into the process, at what point do you tend to use …?

I: Yeah I think at times it would take a decision which is not part of the routine, something you havent' got more experience with in terms of prescribing, if someone has come in with a long list of medication, multiple co-morbidities, or they've got like an unusual syndrome, something different in their past medical history …

I: … so we don't know how this is going to go in …

I: … it's always useful to have information taken from the pharmacist …

JR: Right

JR: OK

I: Yeah

JR: Yeah, 'cause it's all right when you've got a patient who's got one thing going on … I: Yeah

JR: … but that's not normally the case is it

I: The thing with polypharmacy, where it comes in is when nursing home patients, some elderly, some patients with a complex past medical history, a lot of medications and then you're adding in a new substance, or changing the dose where you haven't got much experience with it …

JR: Yeah

I: … or the information, you can't find in, then it's quite useful

JR: OK. So in terms of your, the care of your patients and advice that Medicines Informat have given you, how do you think it influences the care of your patients when you ha used it?

I: I think it has a positive effect …

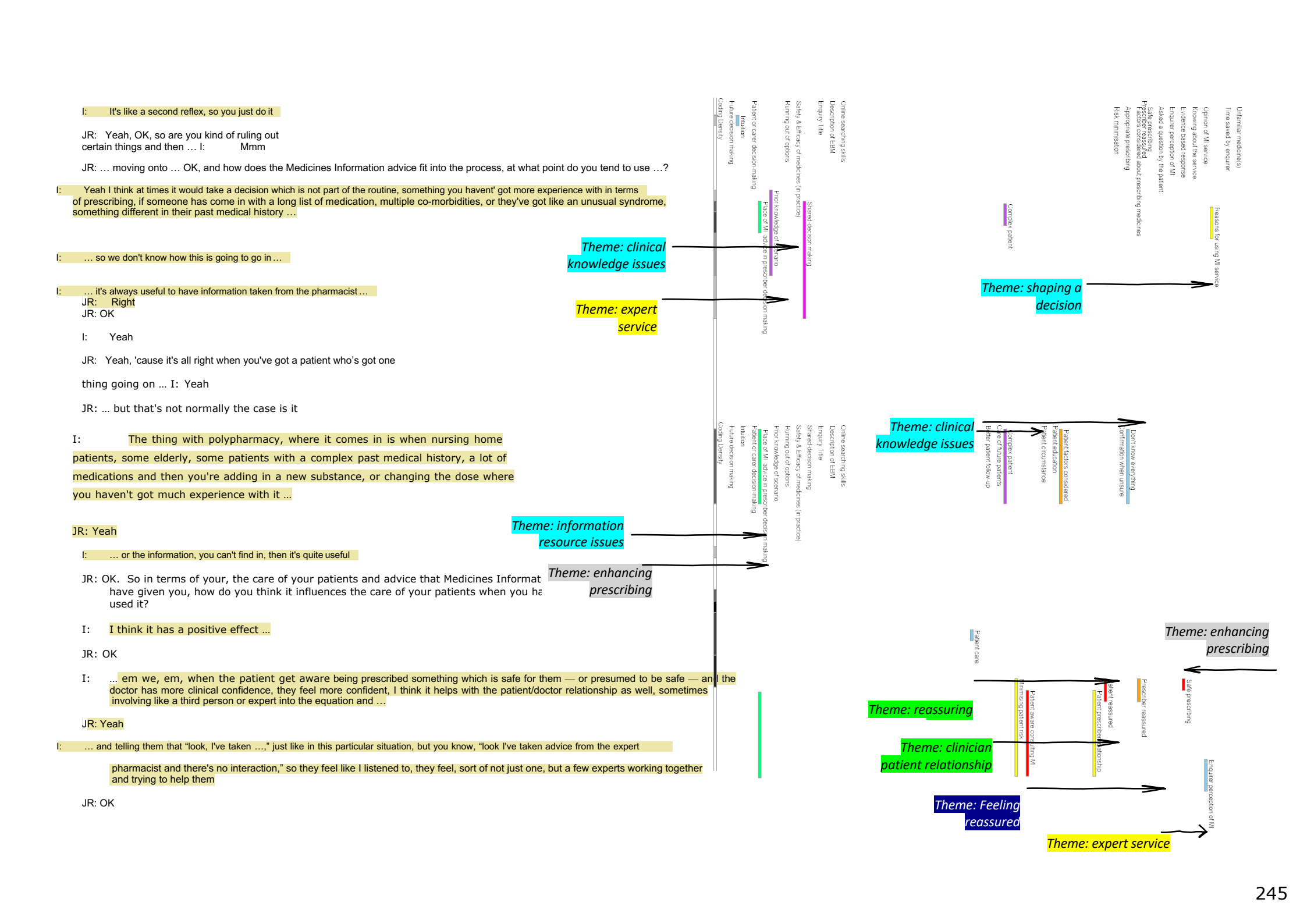
JR: OK

I: … em we, em, when the patient get aware being prescribed something which is safe for them — or presumed to be safe — and the doctor has more clinical confidence, they feel more confident, I think it helps with the patient/doctor relationship as well, sometimes involving like a third person or expert into the equation and …

JR: Yeah

I: … and telling them that "look, I've taken …," just like in this particular situation, but you know, "look I've taken advice from the expert pharmacist and there's no interaction," so they feel like I listened to, they feel, sort of not just one, but a few experts working together and trying to help them

JR: OK



Appendix 9 Table used by Medicines Information centres to collate participant and enquiry details

Enquirer Contact Form											
Name of RMIC:											
RMIC Contact(s)											
Wednesday [insert date]		DATE	DATE	DATE	DATE	DATE	DATE	DATE	DATE	DATE	DATE
Total Number of GP/Dentist calls received today											
Number who have agreed to participate today											

MiDatabank Enquiry no (with RMIC initials as prefix):	**Enquirer OK to be contacted:** ***NB if No leave name/contact details blank***	**Surname**	**First name**	**Title**	**GP/Dentist**	**Email**	**Email sent**	**Contacted by Phone**	**Received Reply/ Date & time to call**	**Enquirer contacted: Date & Time**	**Direct Telephone Contact Number**	**Enquiry Title**	**All Patient/MI pharmacist details/database passwords removed**	**Enquiry form received**

Appendix 10: Participant information sheet (telephone interviews)

Impact of Medicines Information Answers: an evaluation of Primary Care Prescriber Decision-making

Reasons for conducting the study

UK Medicines Information (UKMi) is an NHS funded service which is provided to health care professionals in primary and secondary care. Service evaluation has traditionally involved quality assurance of the service, however little is known about the effect of the information and advice provided on patient care. This study aims to find out how answers to MI enquiries influence prescribers in their decision-making and what impact these answers have on patient care.

Why should I become involved?

This study is being conducted with primary care prescribers in England and Wales who request an answer from their medicines information centre (UKMi) about a patient in their care. You have been recognised as a potential candidate for the study. This will provide us with the opportunity for you to help us understand how medicines information answers are used by the prescriber to inform patient care and demonstrate the potential benefits of the service.

Do I have to be involved?

It is your decision whether you want to be involved in the study. You are free to withdraw at any time, without giving reason.

Benefits of taking part or benefits of the study

For those prescribers taking part in the study there are no intended benefits. The information obtained will however help to determine the effect the UKMi service has on prescribers and patient care and help to make the UKMi service more responsive to prescriber need.

What will happen if I decide to take part?

If you decide to take part you will be asked to take part in a telephone survey that will last approximately 10-15 minutes. The survey will take place on a date and time that it is suitable for you. The interview will consist of a series of questions relating to how you used the medicines information answer. The survey will be recorded to ensure accuracy.

What will happen if I decide not to take part?

We thank you for taking the time to read this information. To ensure we do not contact you again please could you email [redacted] or [redacted] and in the message box simply state 'NONE PARTICIPATION'.

What will happen to the comments I provide and confidentiality?

The survey will be confidential and any information/comments provided may be used in reports but it will be anonymous and all the data will be stored confidentially and destroyed after 5 years.

Results of the study

The results will be included in the researcher's PhD project thesis. The results may be made available for a peer reviewed journal. No individual results will be made available, however a copy of the final results can be sent out to participants upon request.

Authorisation from School Ethics Committee

Ethics approval has been granted by The Behavioural Sciences Ethics Committee, School of Applied Sciences, University of Wolverhampton.

What should I do now if I want to take part?

If you would like to take part in the study please complete the section below and email it to [redacted] or [redacted]. The investigator will then contact you by email to confirm the date and time for the telephone interview to take place.

Contact for Further Information

If you have any questions about this study before deciding to take part, please contact the lead investigator, Jill Rutter or the university supervisors, who will be pleased to help you:

Jill Rutter
Pharmacy Practice Division
Department of Pharmacy
School of Applied Sciences
University of Wolverhampton
Wulfruna Street, WV1 1LY
United Kingdom
Mobile: [redacted]
Email: [redacted] or [redacted]

Professor Rae Morgan/Dr Paul Rutter (Supervisors)
Pharmacy Practice Division
Department of Pharmacy
School of Applied Sciences
University of Wolverhampton
Wulfruna Street, WV1 1LY
United Kingdom
Tel: [redacted]
Email: [redacted] / [redacted]

Please complete and email to [redacted] or [redacted]

- We will contact you **approximately 2 weeks** after you received your medicines information answer.
- If you are happy to take part in this study, **please indicate** below any suitable dates and times when you will be available.

Suitable Date(s) and Times for you to contact me by telephone are:
Please indicate below those that are suitable:

Thurs 26 Jan	Fri 27 Jan	Mon 30 Jan	Fri 3 Feb
AM	AM	AM	AM
PM	PM	PM	PM

The best **telephone number** to contact me on is: _____

Name: _____ Date: _____

Appendix 11: Participant covering email/letter

[Insert Date]

Use of medicines information advice in primary care:
An exploration of effect on prescriber decision-making and patient care

Dear _____

You recently contacted the medicines information (MI) service with a patient query about:

_____

I would like to invite you to take part in a study, which I am carrying out as part of my PhD research programme at the University of Wolverhampton.

We would like to find out what happens after you receive our advice.
The main objective of this study is to find out how MI answers are used in prescriber decision-making and what effect they have on patient care. Participation in this study will involve you taking part in a face-to-face interview that will last no longer than an hour.

The information you provide will only be identifiable by the investigator and her supervisors. No data you provide will be identifiable in any reports or publications. Attached is an information sheet that gives more details of the study. Once you have read this and if you are willing to discuss your use of the advice received, please complete the attached form and email to [redacted] I will then telephone you to arrange a date and time for the informal face-to-face interview to take place.

If you require any further assistance, do not hesitate to contact either myself or my supervisors (Professor Ray Fitzpatrick, Dr Hilary Paniagua and Professor Paul Rutter) via email or telephone. Contact details have been stated in the information sheet.

Thank you for your time.

Yours sincerely,

Jill Rutter
MI Pharmacist/PhD Researcher
Pharmacy Practice Division
Department of Pharmacy
School of Applied Sciences
University of Wolverhampton
Wulfruna Street,
WV1 1LY
United Kingdom
Mobile: [redacted]
Email: [redacted]

Appendix 12: Participant information sheet (face-to-face)

UNIVERSITY OF WOLVERHAMPTON

UKMi
UK Medicines Information

Use of medicines information advice in primary care:
An exploration of effect on prescriber decision-making and patient care

Reasons for conducting the study

UK Medicines Information (UKMi) is an NHS funded service which is provided to health care professionals in primary and secondary care. Service evaluation has traditionally involved quality assurance of the service, however little is known about the effect the advice has on prescribers and patient care. This qualitative study aims to find out how answers to MI enquiries are used by prescribers in their decision-making and what effect these answers have on patient care.

Why should I become involved?

This study is being conducted with primary care prescribers who request advice from their medicines information centre (UKMi) about a patient in their care. You have been recognised as a potential candidate for the study. Your involvement will help us understand how medicines information answers are used by prescribers to inform patient care.

Do I have to be involved?

It is your decision whether you want to be involved in the study. You are free to withdraw at any time, without giving reason.

Benefits of taking part or benefits of the study

For prescribers taking part in the study there are no intended benefits. The information obtained will however help to determine the effect the UKMi service has on prescribers and patient care and hopefully help to make the UKMi service more responsive to prescriber need.

What will happen if I decide to take part?

If you are interested in being involved, you will be asked to take part in an informal face-to-face interview that will last no longer than an hour. The interview will take place on a date and time that it is suitable for you. The interview will consist of a series of open questions relating to how you use medicines information answers in your decision-making and management of your patients. The interview will be recorded to allow transcription and analysis.

What will happen if I decide not to take part?

We thank you for taking the time to read this information. To ensure we do not contact you again please could you emai[redacted] and in the message box simply state 'NO THANK YOU'.

What will happen to the comments I provide and confidentiality?

The interview data will be confidential and any information/comments provided may be used in reports but it will be anonymous and all data will be stored confidentially and destroyed after 5 years.

Results of the study

The results will be included in the researcher's PhD project thesis. The results may be made available for a peer reviewed journal. No individual results will be made available, however a copy of the final results can be sent out to participants upon request.

Authorisation from School Ethics Committee

Ethics approval has been granted by the Life Sciences Ethics Committee, Faculty of Science and Engineering, University of Wolverhampton. NHS Ethics approval was not required as this study is classed as service evaluation.

What should I do now if I want to take part?

If you would like to take part in the study please reply to [redacted] The investigator will then contact you by telephone to confirm the date and time for the interview to take place.

Contact for Further Information

If you have any questions about this study before deciding to take part, please contact the lead investigator, Jill Rutter or the university supervisors, who will be pleased to help you:

Jill Rutter
Pharmacy Practice Division
Department of Pharmacy
School of Applied Sciences
University of Wolverhampton
Wulfruna Street, WV1 1LY
United Kingdom
Mobile: [redacted]
Email: [redacted]

Dr Hilary Paniagua/
Professor Paul Rutter (Supervisors)
Pharmacy Practice Division
Department of Pharmacy
School of Applied Sciences
University of Wolverhampton
Wulfruna Street, WV1 1LY
United Kingdom
Tel: [redacted]
Email: [redacted]

Please complete the box below & email to [redacted]

Yes, I am happy to take part in an interview about how I use medicines information advice.

The best **telephone number** to contact me on is:

Name: **Date:**

Practice address:

Email address:

Appendix 13: Participant consent form

Use of medicines information advice in primary care: An exploration of effect on prescriber decision-making and patient care

This will involve talking to the investigator for up to 1 hour on how you go about using Medicines information advice in your decision-making. Please read the information below and tick each box if you wish to participate in the study.

Please tick each box

I have read and understood the information sheet for the study	
I have had the opportunity to ask questions about the study and have had them answered satisfactorily	
I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason	
I understand that any information I give as part of the study, including patient details, will be treated with strict confidentiality and that I will be anonymous in any written reports from the research	
I agree to take part in the study	

Participant

Signed: Date:	Print Name:

Researcher

Signed: Date:	Print Name:

Appendix 14: Pre/post interview information and checklist

Initial telephone call:

Hello, can I speak to [*Insert Title*]?

You recently contacted the medicines information service with an enquiry and responded to an email saying that you would be happy to take part in a face-to-face interview about how you use our advice in your decision-making and patient care. Is that right?

If at this point the person says No – thank them for their time and apologise for taking up their time

If Yes, continue with script below.

I'm phoning to arrange a suitable date and time to meet up and do the interview. Is now a good time to sort this out?

If at this point the person says No – try to arrange a convenient time to call back.

If Yes, ask pre-interview questions, and agree a suitable date & time. Confirm address & room (quiet without interruptions).

Thank you, I look forward to meeting you on [Insert Date], I will call you the day before to confirm everything?

☐ Pre-interview Checklist

- ☐ Completed participant details form
- ☐ Signed consent form
- ☐ Checked recording device
- ☐ Confirmed time available
- ☐ Explained about recording and making additional notes
- ☐ Interruptions likely/phones diverted/on silent?

Before/after the interview:

Before we start please can you confirm you read the emailed information about the study, including the information sheet.

If Yes, skip below script and move to confirmatory questions.

If No, then continue with script below.

You are invited to take part in an interview as part of an evaluation of the UK Medicines Information Service, which you recently contacted. The purpose of the study is to see how the advice provided was used. The interview will be recorded to allow transcription and qualitative analysis.

You do not have to participate and we will ask you to verbally agree to take part after I have provided you with this information. Even, after you agree to take part you can still withdraw at any time, without a given reason even after you have answered all the questions. It is

possible that you may not wish to answer one or more of the questions, please just let me know.

Any information you provide will be kept confidential and not be shared with a third party. It will only be seen by the investigators. Any information that relates directly to you will be made unidentifiable and all paper and electronic records will be destroyed after 5 years.

Finally, this study has also been approved by the University of Wolverhampton Ethics Committee.

Would you like to ask any questions?

If Yes,

What questions would you like to ask?

If No,

Can we start the interview?

If Yes,

Start voice recorder and begin interview.

At the end of the interview,

Thank you for your time. Do you want me to email you a copy of the final results of this study?

Close the interview.

Appendix 15: Form with participant and enquiry details

UNIVERSITY OF WOLVERHAMPTON

UKMi UK Medicines Information

Use of medicines information advice in primary care:
An exploration of effect on prescriber decision-making and patient care

Participant/enquiry details form

Section 1: Data obtained from MiDatabank *(To be populated by JR)*

Enquiry Details	**Enq No:**			**Agreed to be contacted for research purposes:**		
MI Centre:						
Date Enquiry received:		**Date Enquiry answered:**				
Enquiry Complexity Level	**1/2/3** (exclude level 1)	**Enquiry not answered by investigator:**				
Enquiry Type e.g. ADR/pregnancy/interaction:						
Complex patient e.g. multiple meds/morbidities	**Yes:**		**No:**			
Complex/difficult clinical decision	**Yes:**		**No:** (Exclude?)		**Possibly:**	
Details of enquiry:						
Answer to enquiry:						
Notes about outcomes:						

Section 2: Data obtained from MiDatabank/Phase 1 of PhD/Phase 2 i.e. this study *(To be populated by JR)*

Participant Details	**Name:**			**Address:**	
GP:		**Dentist:**			
Email:					
Phone (mob/practice):					
Previously interviewed:	**Phase 1:**		**Phase 2:**		

Section 3: Participant recruitment tracker *(To be populated by JR)*

Interview invitation			
Date email/letter sent		**Reply received**	**Yes/No**
Agreed to interview	**Yes/No**	**Date/time re-confirmed**	**Yes/No**
Date:	**Time:**	**Location:**	

Section 4: Data obtained from investigator phone call with prescriber (*To be populated by JR)*

Pre-interview data						
Repeat user:			**First time user:**			
No. of GPs/dentists in the practice *(Internet search)*						
Years qualified: *(ask when see prescriber after consent)*						
Seen patient since received MI answer:	**Yes**		**No**		**If no when likely?:**	
Patient outcome known:	**Yes**		**No**		**If no when likely?:**	
Prescriber can access patient notes:	**Yes**		**No**			
Time since answer & interview:						

Appendix 16: Extracts from interview transcripts for selected themes

Safety Net Meta-theme:
All Interview extracts relating to decision-making

Providing a decision

T1 Dentist

…told me what to do

T2 GP

well perindopril doesn't (cause psoriasis) so just used that information in treating the patient. Patient still on perindopril. Not looked for other causes.

T4 GP

…made my decision for me

…basically, gave me all the information I needed.

T36 GP

I think it would have just taken me a lot longer to find out. It was really nice going one route and very quickly getting a definite decision, when I have had to do an online search & check and of course everyone has different opinions & things so errmm – would have taken me a lot longer

T37 GP

They [MI] gave me some information about how I was going to manage it, logistically they told me how I was going to manage it. […] so it wasn't just a just a vague answer – I did what they said"

T38 GP

I've got the patient sitting with me and it's something really crucial and I need to know today or this morning.

F2 Dentist

I'd say it has quite a significant part…

I'll listen to what you say and I'll act accordingly

F9 Dentist

…in a, 'an emergency situation' is probably a bit strong a word, but it is in the situation where everything else has failed me, right, well what, what are we doing now, you know, he's allergic so I've got to give this, or she's taking that but I want her to take this, and you need to take it, I want you to take it now to get you out of discomfort…[…]…antibiotics really was going to be our last, it was our last port of call really, so I needed to prescribe it 'cause the others hadn't worked, our other measures we didn't feel were working…

F11 Dentist

…so we were in a little bit of limbo situation […] we weren't quite sure which way to go with it

F12 GP

those sort of things where you're not, you know sure what medication to prescribe; I mean normally we'll go through the psychiatrist for that but…(JR: right)…occasionally there'll be patients that aren't at a level where they need psychiatric intervention…

I think it was… either six or eight weeks where they were sort of saying, you know, it was either stressing avoid, or using caution, so I thought that's why I'd ask for some advice

I basically rang the patient … rang the patient and prescribed the, the medication

I explained that the, you know that, that medication at that dose had been, had been used …you know eh previously, em and that you know I felt it was a, a, you know safe for her and for, and for the …… for the baby. Em and em that you know that I'd taken your, taken some advice on it and that was the recommendation

F13 GP

The thing with polypharmacy, where it comes in is when nursing home patients, some elderly, some patients with a complex past medical history, a lot of medications and then you're adding in a new substance, or changing the dose where you haven't got much experience with it (JR:Yeah)… or the information, you can't find in, then it's quite useful

F14 GP

When it said in the BNF, you know, not to be prescribed in pregnancy, that's when you know I thought I need to get a bit more information

F15 GP

…because of the CKD [chronic kidney disease], the dose was restricted, she asked if she could have more, her current medication now, she's on Matrifen [Fentanyl patch] which somehow or other managed to get bumped up to, I think it's 100mcg …(JR: Right)…and a little bit of codeine at night if she woke up with pain …(JR: Yeah)… and gabapentin, she couldn't tolerate tricyclics at all, so upping her Gabapentin was a good option really

Confirming a decision

T1 Dentist

Essentially the advice that I was given is that no evidence to state that antibiotic cover is required for renal transplant patients.

I already knew that there was no evidence in the literature to suggest that antibiotic cover was require for renal transplant patients but I needed to have an opinion from a well-respected body and that was provided by the people who called me from the BNF

T6 GP

I already had idea but without name and the information from MI confirmed my suspicion

T7 GP

I probably knew already. But they were able to come back with more recently researched information

T8 GP

It confirmed what I suspected but wasn't 100% sure about. I probably would have prescribed, well I was thinking about prescribing it in any case, and it confirmed that would be the right thing to do. From memory, I possibly wouldn't have prescribed it if there had been ongoing

uncertainty about it.

T14 GP

I was able to take the decision knowing that I've asked experts with access to extra specialist information and I now know that what I'm doing for my patient is absolutely right

T15 GP

Had an inkling that it was going to be sertraline– I mean it's not uncommon that one ends up treating patients for depression with cardiovascular disease, & I had an incident before where I inherited a patient who was on a tricyclic which I didn't think was going to be the right drug & I remembered that it was likely to be an SSRI and I wanted to check that it was still going to be sertraline.

Confirmed it

T23 GP

It had a big influence in terms of confirming that it was the correct thing pharmacologically to do

It's nice just to have someone's opinion; a pharmacological, professional opinion really to confirm that what I'm doing is the correct thing.

T26 GP

It confirmed my suspicions and it convinced me to go ahead rather than take a chance because he'd been taking a chance and using medication not stored correctly

T27 Dentist

I always cross reference myself, I make sure before I prescribe something if I'm unsure to always ring that number cos it's in the BNF, that number for the dentists.

T28 Dentist

It confirmed what I'd decided

I just wanted to be sure that what I was doing was the best treatment for the patient because it's quite a difficult case

T29 Dentist

I'd probably say it clarified what I was already feeling myself anyway, that I didn't want to do anything until I had allergy tests completed.

T35 GP

confirmed what I thought I already knew from looking in BNF that not lot choice for under 12s, basically the topicals really

T36 GP

I think it also gives a bit more power to the decision making within the practice and when giving information to patients. When you say, I have mentioned that I have checked with the prescribing team at the [*MI Centre*] and they confirmed that we shouldn't be doing this even though it's only low
dose.

T39 GP

basically I was wanting to confirm really that there wasn't anything other than that to be concerned about and as mum had only used it the once, I didn't think it was going to be a problem and that really confirmed that was the case. The main problem often is that there

are things you might not have thought about, some other reason and that was fine.

T40 GP

I think the information that you gave us had some sort of comments about that it was not known to be unsafe but use as little as possible and try not to use it if possible, that sort of thing which is fine, I mean you can't always have exact figures on these things. It was the same information I think that basically that was in the BNF, I just wanted to make sure there was not any other information

It just confirmed my concerns that I had helped back up what I already thought.

F4 Dentist

Sometimes someone will come in with a whole 20, 25 tablets, and to manually check it, it's going to be a bit difficult even though I, you know you, there may be very little effects, say from amoxicillin I still would probably get it and have a look, just maybe more as a reassurance than anything else.

F9 Dentist

I think realistically it's usually for something that I'll know is going to be all right but I just want that, that bit o' back-up, so clinically I suppose I've already made the decision because that's in the [dental treatment] pathway,[…] usually in dentistry it's going to be antibiotic prescribing and that's going to be your last option anyway, if your local [dental] measures haven't worked.

F10 Dentist

I don't think I would have taken the chance in prescribing the miconazole, even if she'd had it before,

I think when they come about it's always just for, to see if somebody else have a different information that you're not aware, and then you can take better decisions,

F14 GP

when it said in the BNF, you know, not to be prescribed in pregnancy, that's when you know I thought I need to get a bit more information because it was, it would have been, had we discovered that she was on Simvastatin and she wasn't pregnant at the time, then the process might yeah, I imagine the process would have been to say look, pretty much stop Simvastatin now, but I wouldn't have contacted your service, 'cause I wouldn't have been …
… concerned about the risk …[JR: Yeah]: … to the pregnancy surely I mean I suppose it didn't alter my decision that she should stop the medication …[JR: No]…there wasn't any question …at any stage …[JR: … yeah …]… that she should continue her Simvastatin, particularly as she was on it for a primary prevention rather than a secondary prevention, but even so, it wouldn't have altered my decision to stop it …

you don't want patients to be, continue with medications that, you know may 'cause harm, so [I suppose that's about patient risk?] in this situation it was more for the, like I say for the advice and counselling rather than you know what to do about the medication per se, 'cause that was already stopped.

I mean, yeah, that's it, I can think of at least two or three that have related to pregnancy and breastfeeding, because I think the information in the BNF is not that extensive in those areas …

I think yeah, sometimes you've got an idea about what you might, or might not, do, and I think it's helpful to get a more, you know, more expert opinion about that to confirm what, you know, which hopefully confirm what you were thinking already

F5 Dentist

the reason I contacted you was going on a domiciliary visit, so limited amount I could do, thought antibiotics might be needed, was unsure when I'd looked in the BNF, so I just wanted confirmation

I'd err on the side of caution, I'd just, you know I wouldn't, if I wasn't 100% on something I'd just not do it rather than take the gamble

If it's there in black and white in the BNF then you're happy, but sometimes the BNF, it just doesn't quite say the exact wording you want, even if it's just kind of a very similar drug, unless you, sometimes you just want someone to say "yeah, 100%, that's right," but then I'd probably only do it if I'm really unsure because I probably don't have enough time in the day to, you know..

Shaping a decision

T12 GP

The concern was that the patient had been treated with metronidazole for bacterial vaginosis. She then came back that she was pregnant and looking at her dates she probably would conceived have been the first week or so of pregnancy that she had taken the dose of metronidazole. So the first thing I wanted to know was what actually is high dose of metronidazole and I think that it's the 2g stat dose which dose is not what she had. Then the next thing was whether there was concern about teratogenesis

T13 GP

Because they usually come with an answer to questions that I can't find an answer to very easily

T14 GP

Had Neurologist writing back anyway with a specialist recommendation and I looked at BNF which gave me some concerns about renal impairment and valproate and then I thought that as the GP I have to write the prescription although the consultant has given the advice, It's my responsibility, I'm writing the legal document and I'm taking the clinical risk so at that point has the consultant really taken on board the degree of the patients renal impairment which was significant and the BNF gives me some advice. So that's the sort of situation that's starting to be tricky so I thought actually this is where I am going to the XXX Medicines Information Service because you want something that's a little bit more in depth. I've already got 2 sources of information, the BNF and the consultant Neurologist and none of them are writing the prescription so in that situation I thought – and they gave me very clear advice, have you got it there?

that would have been really hard for me to get & that really helped me because I was able to take the decision knowing that I've asked experts with access to extra specialist information and I now know that what I'm doing for my patient is absolutely right.

T15 GP

I use them whenever there is something tricky and I need just another level of insight that isn't in the BNF, that isn't in the drug interactions there. The tricky multiple drug interaction situation or a very tricky patient with multiple allergies or multiple pathology and lots of morbidity, I have a lot of patients like that and they are really good.

its really when you write to the psychiatrist and you've worked it up and you can say I've been in touch with the [*MI Service*] ..errm ..this is their view and this is where I'm going it's useful, very very useful.

Sometimes I don't, it's out of hours and they're closed and I have to make a decision, I had a man last week with advanced renal failure with gout, that's a very. Pre-dialysis with an eGFR of 12, can't have NSAIDs, he's on a tiny dose of allopurinol which is a bit questionable anyway, I need treat him he's in terrible pain and I look at colchicine and the BNF says don't give. I would have gone at that point to the medicines people and said look the BNF is saying don't, I'm probably going to have to give him steroids, is colchicine really contraindicated. So I thought at this point, this is where you do need a clinician, so I discussed it with a renal physician and they said don't worry about the BNF in practice we do use but in very reduced doses even when the BNF says you can't so at that point, it was at night I needed to make a decision straight away I gave him colchicine on the basis of my conversation, ignoring the BNF and the man is better. Sometimes I do it without the [Regional] medicines but in the daytime I might have said you what do the manufacturers says because the BNF says this and the renal team say this. I might have done that but actually I'm not so sure because the clinical expertise of a renal physician treating patients like this all time its invaluable

T18 GP

Because the more I had concerns about the patient then you reassured me that it was alright

T20 GP

Read advice and prescribed gabapentin for this lady…..I didn't prescribe amitriptyline which I was thinking about with the phenytoin. I was informed by [the MI Pharmacist] that amitriptyline is not licensed for neuropathic pain and the dose is much lower than antidepressant. Basically we looked at pregabalin and gabapentin and because of the cost of pregabalin decided to go for gabapentin.

T23 GP

It was triggered by citalopram, the drug manufacturer saying that levels above I think it was above 40mg put an increased risk of QT interval prolongation and that was exacerbated by the concomitant use of quetiapine, as quetiapine also is known to have a problem. So the reason for talking to them was to find out if we needed a wash in /wash out period or if we could just start the sertraline at the same time as stopping or cutting down the citalopram really. I had a couple of patient that were in the same position

T24 Dentist

Patient seemed to have had it impressed upon her by the surgeon that she would need antibiotic cover. I'd spoken to her about it then having looked it up, I think she was allergic to amoxicillin so then I was thinking of what else to give her and looked up clindamycin which would have been my second choice. It said something there about it possibly causing some other problems particularly in elderly patients or those who'd recently had joint replacements. This is off the top of my head now - there seemed to be a number of contradictory things, particularly in high risk groups or potential complications in those on big doses of clindamycin.

T30 Dentist

Didn't really have any concrete information (BNF) so I was a little bit concerned the patient had come from secondary care from the dental hospital, orthodontic department to have this elective procedure in a sense. The difficulty was that the family weren't good historians because there was a language problem and it was the older sister that was doing all the talking so we couldn't even get information like who is GP was or who the specialist was that dealt with this condition so the only thing that she knew was that he couldn't take aspirin so that's what actually prompted me to ring yourself because I thought I'm not happy doing this. He'd come from the dental hospital and they'd obviously overlooked the issues that possibly surrounded this condition

T35 GP

to make an informed decision basically I guess, so that the patient was happy getting some treatment that was evidence-based.

T36 GP

Had information from the PCT which was what led to the enquiry in the first place. (What information did you have from the PCT?) It was that citalopram does increase the QT interval and shouldn't be co-prescribed with other drugs that did, including the tricyclics. What I wasn't sure about was cos they said it was dose dependent was whether that meant that definite no no to small dose amitriptyline or whether if on a lower dose citalopram with low dose amitriptyline it was OK?

I think it would have just taken me a lot longer to find out. It was really nice going one route and very quickly getting a definite decision, when I have had to do an online search & check and of course everyone has different opinions & things so errmm – would have taken me a lot longer

F1 Dentist

so if I've … I was going to say if I've been doing something wrong, but if I haven't been like following the correct guidelines, they've like changed so I'm following the up-to-date guidelines, I don't think I've ever like not done that really, I've always been in line with what you've suggested…

F3 GP

it's usually in pregnancy, you know where the data changes quite frequently, the database changes … antidepressants in pregnancy is another one I've used you for … use of antidepressants in epileptics is coming to mind now,, which was, you know the one with the lowest incidence of reducing the seizure threshold …

I suppose I use it as … in, well, I don't suppose there'll be NICE Guidance to cover those awkward situations when I phone you, that's probably where you come in …

it's good to sort of like have a bank of stuff that I can refer back to, you know in slightly different clinical scenarios I can use the same guidance I suppose

I mean you're not normally specific to one drug, you'll give a choice, won't you, of two or three different scenarios, and I guess I choose the one that's … if it was an antihistamine I suppose, the first [line, or one?] here is Cetirizine, isn't it, it's our cheapest one …

I can phone you and get the information I need straightaway to make a decision

Usually, you know the patient's already pregnant and is on an antidepressant and you're worried that it might not be safe and the patient doesn't want to stop, and it's sort of then trying to gather together some evidence; is it safe to continue, or not, while you're waiting for their appointment to come up at psychiatry, you know through an antenatal clinic, which might be some weeks away …

F4 Dentist

Well, No I thought, because of the, I'm not sure what this drug's going to do and there was, obviously and it was checked that there wasn't anything specific that I didn't act on that, I thought well, if there's no evidence that it's bad or good then I wouldn't do it, so in terms of management I chose not to prescribe that, does that make sense?

I weighed it up and I thought well, I'd rather not just in case there is an adverse effect, even though there's nothing reported, but there's nothing specific that actually said that it couldn't do damage to foetus or baby, so I thought well, if there's an alternative option, which was Chlorhexidine, that was fine …

I would have just prescribed the Chlorhexidine, and then did what I did, so it wouldn't have changed the management, but knowing that, the thing about the Peroxyl now I probably wouldn't have prescribed that, or if a patient asks, you know what about this mouthwash Peroxyl, then I would explain to them what I've been told by Medicines Information and then sort of say well it might be worth just using the Chlorhex instead

to be honest Medicines Information is pretty much my first port of call

F5 Dentist

… I'd probably make a judgement on, like on that case, I just wasn't sure, so it was definitely worth the call, but if you, you know you're happy, maybe you would discuss it with a colleague, the other way round, do that first and if everyone's unsure then it's probably time to call

F6 GP

I wasn't sure whether and how you can prescribe that, so I thought it was good but I wasn't sure much about it, so I've never up to this point prescribed codeine in pregnancy. I had a feeling that low dose codeine, 8/500 was probably going to be OK, but I thought 30/500 is definitely out, [?] I thought OK I'll ring you guys and see what you can help me with

So then once I got that, I did query also you know the strength of the codeine, and they said you know, it doesn't make a difference to the strength of the codeine, in this regard, so I spoke to the lady, I said you know let's, it's fine to take some co-codamol, I elected for the 8/500 dose then and thought we could titrate upwards if necessary.

It's the first time I've ever prescribed anything apart from paracetamol in pregnancy, and I've been a GP since 2006, I've seen many women and I've always advised them, look, you know things aren't safe, best just to stick to paracetamol, hot water bottle, and then just, you know let nature take its course, and so yes I, and now I understand that you know I can prescribe codeine and non-steroidals; that was quite interesting about non-steroidals, I thought they were a complete no-no in pregnancy and you know I got the advice, that was really helpful, made sense as well

I put it high at the top because I'd say that, you know you guys are specialists in your field, you're experienced pharmacists, you've got a, I was actually going to ask you about what kind of databases you have, you know I can hear typing in the background …

mean I, if there was a, you know general advice, like NICE Guidelines or something straightforward then I wouldn't be ringing you …

… because you know it's there, in plain sight, I would only contact you whenever there's a complicated case …… where specialist advice is required and then whatever you gave to me I probably would just take that advice

before I think of asking for your advice I probably would try and get a general feel for you know what the patient wanted; both the cases I've spoken to you about are related to either being pregnant or breastfeeding, so if a patient said to me "whatever happens I'm not going to take any tablets or any medication," then there would be no point in me ringing you, so I would probably ascertain that they, you know they would be happy to take some treatment, and if they said yes, then I'd go ahead and ring you guys

F7 GP

for my decision-making really it didn't make any difference to my particular management,

I think the difficulty often as a GP is that when you're asked to prescribe a medication that you're unfamiliar with, so that might be a prescription request from secondary care, or from a patient that's come from abroad on medication that is less often prescribed here or is not prescribed here at all, and I suppose I haven't actually used the service in that way but I may do

if you are not comfortable that you have a sufficient knowledge about a medication before you prescribe it, ultimately you are taking responsibility by signing the prescription that you have to justify that you've got enough knowledge about that medication and in that condition to be able to safely prescribe it, errm…so I think it could be really useful if I was put in that position

Whenever I've had some interaction with Medicines Information, it's always presented in terms of evidence-based, some information that I got a couple of years ago about natural therapies for symptoms of the menopause, and that was presented really excellently with evidence: was there evidence for it, and was it effective and was it safe, in that format, and that's really helpful, because it's visual and then I can talk to patients about it – it's likely to be safe, we're not sure about the evidence, but it always, well my experience, I get very good feedback from Medicines Information about the level of evidence there is for each of the bits of advice that's been given …

… and that's helpful in helping me to make a decision on acting on that or not

Sometimes it's really useful if I've got it written down, if a patient comes back, to say this is what I've done and to actually, we can make a decision together and actually it's a shared decision-making often, if it's not clear cut, if it's not you know, it's not 'you've got hyperthyroidism, you need thyroxine,' if there's more leeway in making a decision about whether or not to prescribe, and often you know we can come to a shared decision, so I've used it for that.

F8 GP

if I phone about black tongue, I don't want you guessing, so you have to do your homework. That's one area called evidence-based medicine.

why shouldn't you know something more than I do?

F9 Dentist

I think it's cos we're aware of it because we run the oral surgery service, but we're also aware that they're quite unpredictable as well, so em, whereas with Warfarin we kinda know where we stand and in prescribing, we usually get in touch with the phlebotomist and ask them to, to do a check afterwards, but with that yeah, it was a lady, she'd not been on it too long, and with it being a bit unpredictable, and from what I can gather it's very new to medicine anyway, so people don't really know how it's reacting, so I thought right, I'll give you a ring just to make sure that there aren't any new interactions that I might have, might not be aware of. Obviously I looked in the BNF but because obviously that's an annual, or bi-annual publication then my concern was there might be something come up that I wouldn't know about, so …

generally speaking a lot of what I use your service for is the interactions, and as I say we'll look at the BNF first, but if there's any doubt in our minds we'll give you a ring. And we eh, we, I'd spoken to our local oral surgeon actually regarding Pradaxa and those kind of drugs, and his immediate thing was if they need any extractions or anything like that send them straight to hospital because it's so unpredictable, so I wanted to ring just to make sure I could prescribe

safely — or as safely as possible — because I understand that they're not monitored as well, like warfarin …

We'd done everything we could with regards to treating the patient to drain the infection and treat it in that manner, so antibiotics really was going to be our last, it was our last port of call really, so I needed to prescribe it 'cause the others hadn't worked, our other measures we didn't feel were working, you know, so …

I rang on that occasion as well, and it was agreed between kind of the three of us that actually it wasn't an allergy, that it was more a, you know, it was the side-effects of it, however, just for that short period of a three day course, we were giving, perhaps you know, maybe just get through it or say, take a paracetamol or two eh, and, and that was kind of made between the three of us then and I think the patient was kinda, he was happy that it was, it was a group, almost a group decision,

In all honestly usually when I've used you it is in a, 'an emergency situation' is probably a bit strong a word, but it is in the situation where everything else has failed me, right, well what, what are we doing now, you know, he's allergic so I've got to give this, or she's taking that but I want her to take this, and you need to take it, I want you to take it now to get you out of discomfort, so yeah, it's always done really quickly.

I think that patient we talked about wi' the anticoagulant, you know she was in before lunch, I kinda sent, sent her off said yeah you know this is what we're going to be doing, I'm 100% sure it's going to be right, but I'm going to take further advice on it, so there we go, I'll give you a shout after lunch, keep your mobile on …

… you know, it was great, rang her up, ten minutes later reception rang her and said "yeah, go for it …," you know "you can get this prescription"

so clinically I suppose I've already made the decision because that's in the pathway, and with it being, usually in dentistry it's going to be antibiotic prescribing and that's going to be your last option anyway, if your local measures haven't worked, so I suppose clinical decision-making, it doesn't bear a huge impact on it but it's more allowing that final stage to go ahead if it's suitable

so I wouldn't say it's sent me one way than another, if that makes sense, you know, I mean we've already got to that end point …

so … rather than it being a, here's your antibiotic, oh I'll try and drain it later, sort of thing, so we tend to follow that pathway of using it as a last option, so the decision is already kind of in the pathway, it's just to make sure we can do it, you know …

helps us to deliver safe treatment I think, eh yeah, 'cause it, generally you know you're down to a decision where you need to know if you can prescribe something or you need to know you can go ahead with something,

F11 Dentist

as soon as I realised we need to do the extraction and there were going to be, possibly some issues with it being a new drug …

… I thought, we just needed as much information then to, to proceed with the extraction

generally [sighs] em yeah, if it's a, a drug-related issue then I'd generally use you as the first port of call …

we had the initial advice on the Bisphosphonates so we were probably quite uptight about that, probably last year and a few years ago as regards extractions, but I think we're becoming a bit more relaxed about doing it, I think we worry too much about doing the extractions on the oral Bisphosphonates, but obviously we're very careful with the intravenous and probably wouldn't do any extractions on anybody with intravenous Bisphosphonates, and always look at referring those to a specialist centre, so em we do use that information that you give us to, you know then incorporate into, you know the sort of practising life and things like that, so…

I think it's, yeah it's, as I say with the pathway you gave us on, on, on the patients with cancer, you know that's influenced, you know how we would deal with you know patients who come through the door now, you know who are unfortunate to, you know, to have cancer,

it gave us further ideas, eh well further avenues which we could explore to try and get some more information so that worked quite well. Once again the Bisphosphonates, we've just adapted that as, as time's gone on, so em yeah, it's eh, yeah we've, it's certainly something we do use, well I'll certainly use a lot and, and value the service

F13 GP

…it was quite a lengthy consultation, she asked quite a few questions and in the end asked this as well, so I thought rather than, because I looked through the BNF straightaway and I couldn't find any potential interaction there …

… then I think I had your number handy as well, so …

… the information advice line, so I rang in on the speaker there and then and spoke to your people …

if you can't find it, if you've got previous experience of it, like I know about Topiramate and St John's Wort now …

… so we utilise it, but if we don't and it's not written information, something new comes across …I think at that stage we think we need some advice and … we'll get hold of you girls?

I think at times it would take a decision which is not part of the routine, something you haven't' got more experience with in terms of prescribing, if someone has come in with a long list of medication, multiple co-morbidities, or they've got like an unusual syndrome, something different in their past medical history …

The thing with polypharmacy, where it comes in is when nursing home patients, some elderly, some patients with a complex past medical history, a lot of medications and then you're adding in a new substance, or changing the dose where you haven't got much experience with it …or the information, you can't find in, then it's quite useful

I think it helps with the patient/doctor relationship as well, sometimes involving like a third person or expert into the equation and …

… and telling them that "look, I've taken …," just like in this particular situation, but you know, "look I've taken advice from the expert pharmacist and there's no interaction," so they feel like I listened to, they feel, sort of not just one, but a few experts working together and trying to help them

F14 GP

I can't think of an occasion where it didn't give me the answer or didn't enable me to make a management decision, where I was kind of left thinking well I've got this information but I don't think … I'm any further forward,

I suppose the decision to ask for advice is when you've got a prescribing question or query, something that's out of the ordinary, something that you just don't, can't access the information, it's somewhere else …

… and something where you potentially have got time, because if you need to make a decision there and then, you need to make a decision there and then, you have to sort of balance the level of risk on that, but where you've got a bit of time to delay your decision …

it's the unusual and the new, unusual …sort of scenarios …about medications which don't arise every day, if, and I'd say time comes in to it as well, I think it's a, you know you can't be phoning somebody …

As far as the question about when would I contact your service and when would I contact a specialist at the hospital, I think if the question, if the patient I think can be managed within primary care … but I need some specific prescribing advice, then that's when I'd contact your… service.

F15 GP

… and Gabapentin, she couldn't tolerate tricyclics at all, so upping her Gabapentin was a good option really, and I just decided to ring the drug information pharmacist and see how much of a risk I was taking, because I am of that generation of doctors that the guidelines are there, but at, I think sometimes now we do tend to have this 'perfect' approach to prescribing — which is good — but it leaves the patient struggling, and I am prepared to talk to people I know about the risks we're taking with different sorts of medication, and if it seems reasonable slightly step outside, but then I thought I'd speak to the drug information pharmacist …And she got back really quickly and said actually it's fine … so I upped it, so she's now on 1200mgs…

but really you can't do that now, I don't think, so a little bit of science behind supporting the decision you're making is actually helpful

so you know just sort of try and get to that point, and if I feel I'm doing something that really I shouldn't then I will look for advice, but I haven't …… used this service before

A little bit …more information to make the … decision …'cause I'd have then been reduced to taking the consultant's advice, but it's still my responsibility if I write the prescription. Not doing it, because I was worried about the consequences, or increasing it anyway, but probably being a little bit more anxious about it, because these aren't easy decisions to make when …

… you're treating people with either unlicensed medication sometimes, or you are stepping outside the guidelines, potentially with significant consequences …… so I'd have felt a lot more anxious about doing it

I think that, that's usually probably why you look for that sort of information, because if you want information on how to treat something that's out there and quite easily accessible through the guidelines, but when you're trying to weigh up risk, you know, whether that be your, you know, using an unlicensed medication, or prescribing out of guidelines, that, you need to speak to … it has to be more tailored, doesn't it?

The advice has to be more tailored…quite neatly in that case actually, 'cause the … the BNF clearly states that you shouldn't increase the dose of Gabapentin beyond 900mg when the eGFR is, I think it was less than 45 …

.. I can't remember, that's what the BNF states, but actually when you ask, when I asked J and she got all this additional evidence from other people, some of it anecdotal from the renal unit I …

… they'd actually suggested it was safe, so that made it easy to make that decision

As I say I, I don't really know why I haven't used it before, and actually as I said to you in my email, I will use it now when I've got …got queries …

… because I think that … it's very helpful and it's … that's a really good word 'practical' …

… it's that, it's what I'm talking about, about the sort of looking at your guidelines and the situation and blending them together and coming [out?] with the right solution

I, I think what I found so helpful about speaking to J was that it was helping me come to a conclusion of what to do, whereas perhaps speaking to the Drug Information Pharmacist associated with drug companies, it is actually giving you, you know, all the different risks and the numerical risks and that sort of thing, and then 'handing it over' if you like …… so you get more information that you can make your decision on

… and is it worth taking that risk or are you going to 'cause somebody more problems than you're solving; that's definitely … I'm just trying to think … and that is definitely a reason …reason to phone

the black and white stuff is really the, you can find the information, it's the grey areas that you need the help with isn't it?

Impact on Prescribing Meta-theme:
All interview extracts relating to prescribing themes

Immediate change in prescribing

T1 Dentist

Essentially the advice that I was given is that no evidence to state that antibiotic cover is required for renal transplant patients.
As an advisory body there was enough evidence to use that as a basis for not providing antibiotic cover despite the consultants wish to prescribe the antibiotics for the patient. So I actually got the consultant to issue the antibiotics for the patient so I didn't play a role in it.
From my point of view there was no evidence from any advisory bodies (*i.e.. the phone No in BNF*) to suggest that antibiotics are necessary.

T3 Dentist

So it did really impact being able to check that what I was doing was correct & therefore give it to him straight away
..enabled me to give the dose required there and then which I actually I believe helped with the healing. Basically not been able to take out tooth and had been operating on the site for a while. I perceived he would have quite a lot of pain and swelling as a result of it so that's why I wanted to give antibiotics that day. So it did really impact being able to check that what I was doing was correct

T9 GP

Well, I knew what the protocol was, which I wasn't aware of before, I know where to find more information if I wanted it and I was comfortable prescribing it for the patient because I felt comfortable that I had enough knowledge to do so.

T12 GP

I supposed it changed my management in that I didn't have to do anything else.

T20 GP

I didn't prescribe amitriptyline which I was thinking about with the phenytoin.
It can only be good, can't it really because I needed some advice & I got it so potentially I could of, which hopefully I wouldn't have done, Rx the amitriptyline anyway & hoped for the best.

T37 GP

they just gave me the information about how I was going to manage it, logistically they told me how I was going to manage it…

F1 Dentist

changed the prescription that I'd given to the patient, I gave her a lower dose of the toothpaste

F2 Dentist

she felt this was a reaction with the adrenalin in the local, and the outcome of it is that we've now used adrenalin-free local with the guy and not had a repeat of the same problem

Enhancing Prescribing

T10 GP

I'll be asking them things that I can't remember because I don't use it frequently enough & I also need the confidence to know that what I'm doing is completely up-to-date and correct (things change)

T19 Dentist

They gave me as much information as exists at the moment but I think the drug is a relatively new drug and no longer term studies available, so they've given me as much as is out there.

T20 GP

Whoever I spoke to was very thorough and talked me thru looking at gabapentin & pregnancy & stuff. Obviously, we decided that amitriptyline wasn't the way forward

I was informed by her that amitriptyline not licensed for neuropathic pain & dose is much lower than antidepressant. Basically, we looked at pregabalin & gabapentin & because of the cost of pregabalin decided to go for gabapentin. Aware of cost, more expensive, so gabapentin seemed to tick all the boxes really

T36 GP

my gut feeling is that if their a young person that's only on 20mg, probably having 10mg of amitriptyline is probably fine but when it's clearly stated that you can't do it, you can't do it.

T39 GP

The main problem often is that there are things you might not have thought about, some other reason and that was fine.

F1 Dentist

I had a patient taking oral Bisphosphonates and I did an extraction and the guidelines were to follow up like in two to four weeks, so I brought the patient back just to make sure everything was healing fine and everything was, and I've seen them like for a few more check-ups since and everything's been fine, so I probably wouldn't have done like the three to four week check-up if I hadn't have known about it through the guidelines, I would have just seen her at the next like check-up appointment in six months …

F4 Dentist

but knowing that, the thing about the Peroxyl now I probably wouldn't have prescribed that, or if a patient asks, you know what about this mouthwash Peroxyl, then I would explain to them what I've been told by Medicines Information and then sort of say well it might be worth just using the Chlorhex instead

In fact yesterday, a few days ago I was giving a list of patient drugs to the Medicines Information and they said, noted an error that the patient's taking Propranolol and Atenolol, they said they can't be doing that, can you just double check that, I asked the patient and she said "oh yeah, I'm taking both of those," and then we had to check with the doctor, and the doctor said "oh no the atenolol was dropped," so I was made aware of things which I wouldn't have picked up on

F11 Dentist

Whenever I've had problems previously, [.....] I've felt then confident to use that information that you've given to you know, then to take forward with the patient and you know hopefully…treat them in a fairly safe manner.

F13 GP

rather than taking an educated guess and then taking a risk sort of thing and not being very sure, I think it's always a good idea [to contact MI]…

Shift in prescribing practice

T9 GP

was able to share it with my partners, the other doctors, so they were aware of it.

T11 GP

If I now know these things are around, I will be very curious & I will try & find out thru [name of PCT] prescribing

having come across the Synvisc, I now realise that there might be other ways of exploring what this could be about. Means that I've got to learn more about it.

T27 Dentist

In future I know that if I'm in a similar situation that I can give it and now I know that metronidazole is safe

T32 GP

Actually not just one patient, it's several patients. So we looked through all the patients that we'd got in the practice on citalopram and each individual doctor went through to see whether they were also on tricyclics in particular, but also other drugs that may affect the QT interval.

T36 GP

I've already changed quite a few patients usually to sertraline if they wanted to carry on with the amitriptyline.
errm… some patients on a higher dose as well so we were contacting them,… well probably at least 10.
Actually not just one patient, it's several patients. So we looked through all the patients that we'd got in the practice on citalopram and each individual doctor went through to see whether also on tricyclics in particular, but also other drugs that may also affect the QT interval

F2 Dentist

dependent on the response I get from your service, I will modify my practice to take account of what you guys say and advise

I was concerned we, you know, got guidance, modified our practice, good result

F3 GP

I find when you send me the information on email I'll print it off, it's in my drawer and I refer back to it again and again.

I think I've approached you about switching antidepressants as well, I've got some information that I use quite regularly for that, from the, I think, is it from the Maudsley Hospital, was it, there was a protocol I got from you there, that was a few years ago, but I still refer to that … … if you let me check my drawer …

it's good to sort of like have a bank of stuff that I can refer back to, you know in slightly different clinical scenarios I can use the same guidance I suppose

it's usually in pregnancy, you know where the data changes quite frequently, the database changes … antidepressants in pregnancy is another one I've used you for … use of antidepressants in epileptics is coming to mind now,, which was, you know the one with the lowest incidence of reducing the seizure threshold …

F4 Dentist

so I got an email sent and then we sort of printed that out and put it on our noticeboard, so we do that as routine now, if there's anything sort of specific

so you change your practice in terms of what you know, this is, I'm fine with this and you can prescribe it, so the information I suppose gets reinforced in your sort of own knowledge of what you can and what you can't prescribe, what interacts, what doesn't interact

if it's a particular big one like the latex in anaesthetics, we'll tell everyone else that as well you know we receive the emails, from medicines information saying these are the anaesthetics that are latex-free, you can use them but watch out for these. Then we'll put that up on the noticeboard and everyone will know that and then that's becomes part of our sort of, so yeah in terms of that it's quite, it's yeah it's invaluable

it does affect my decisions that I make in the future for patients taking antihistamines, I know which one's drowsy, and which one's not going to be drowsy, rather than having to read a book and just sort of do it that way, which would maybe look a bit unprofessional when the patient's sort of sitting in the chair, yeah.

F6 GP

Since then I have seen other patients who have had pain in pregnancy, and it's given me like more confidence to advise them, and even few last week I was actually speaking to a staff member who's pregnant and she's asked me about analgesia in pregnancy and I knew the advice to give her …

they gave me some advice about using high dose fluconazole and things like that, and that was an email I got, and then whenever this issue arises I just do a search of my emails and find that advice again and re-use it,

It's the first time I've ever prescribed anything apart from paracetamol in pregnancy, and I've been a GP since 2006, I've seen many women and I've always advised them, look, you know things aren't safe, best just to stick to paracetamol, hot water bottle, and then just, you know let nature take its course, and so yes I, and now I understand that you know I can prescribe codeine and non-steroidals; that was quite interesting about non-steroidals, I thought they were a complete no-no in pregnancy and you know I got the advice, that was really helpful, made sense as well

F7 GP

I've used it in repeat consultations, I keep some of that information here in surgery and I can bring it out, because, I've mentioned the HRT one, or alternatives to the HRT, I still use the information I got even a year or two ago with patients to talk about some alternatives,

F9 Dentist

We have a server that runs all the computers in the surgery, [.....]…so I said to the, told all other the clinicians, you know, this document [about new anticoagulants and bleeding risk] might be helpful, and it's on our server, so that's accessible …

almost solved the wider problem as well, that we have access to something that we hadn't had before and all the clinicians can have a look

We had a bisphosphonate sheet, like the one that you sent us, on the server as well that we all access…I'm sure I've got that one.

F11 Dentist

so em we do use that information that you give us to, you know then incorporate into, you know the sort of practising life

it gave us further ideas, eh well further avenues which we could explore to try and get some more information so that worked quite well. Once again the Bisphosphonates, we've just adapted that as, as time's gone on, so em yeah, it's eh, yeah we've, it's certainly something we do use, well I'll certainly use a lot and, and value the service

I think the more patients that you see, I mean the more extractions you do on, on, in patients on Bisphosphonates, the more confident you become that it, it's not as big an issue as we possibly thought it was …

I think it's, yeah it's, as I say with the pathway you gave us on, on, on the patients with cancer, you know that's influenced, you know how we would deal with you know patients who come through the door now, you know who are unfortunate to, you know, to have cancer,

you [you're a specialist service who, you know are able to give further advice to, to dentists on certain aspects of, of their treatment which will enable us to, you know treat them in a safer manner in future …

then I can just stick it in a file and it's always good for reference at a later date

F12 GP

…so I'll put it on that resource there [shared network]…and email round saying "I had this issue today, this is the advice I was given, if you want further advice so people know where to go…

F13 GP

if you've got previous experience of it, like I know about Topiramate and St John's Wort now… so we utilise it.

Appendix 17: Summary of medicines questions asked, demographics of clinicians and telephone interviews

Date completed	**Interview code** (MI centre code)	**Question**	**Enquiry complexity level**	**Type of enquiry**	**Clinician (Male/ Female)**	**Interviewer**
08/11/11	**T1** (MIA)	What antibiotic can I use for dental prophylaxis (root canal treatment) in a kidney transplant patient?	2	Choice of therapy Admin & dose Renal	Dentist (F)	Student 1
29/11/11	**T2** (MIA) (1 of 2)	Can perindopril (ACE inhibitors) exacerbate psoriasis?	2	Adverse effects	GP (M)	JR
24/11/11	**T3** (MIA)	What is the correct dose of amoxicillin in a 16 year old?	1	Admin & dose	Dentist (F)	JR
13/01/12	**T4** (MIA)	Can I prescribe mirtazapine if the patient is on warfarin?	2	Interaction	GP (M)	JR
27/01/12	**T5** (MIA)	How do I convert a patient from Zoladex (leuprorelin) implant to Prostap (gosarelin) injection?	2	Admin & dose	GP (F)	Student 3
27/01/12	**T6** (MIA)	What is Aprax? It is from Turkey	2	Identification	GP (F)	Student 1
29/11/11	**T7** (MIA) (2 of 2)	How do I treat psoriasis in pregnancy? (1st trimester)	3	Pregnancy Choice of therapy Adverse effects	GP (M)	JR
03/02/12	**T8** (MIA)	Can I prescribe sodium cromoglicate eye drops for a 1 year old child?	1	Admin & Dose	GP (M)	Student 2
30/01/12	**T9** (MIB)	What melatonin preparation is available for a child?	2	Availability and supply	GP (M)	Student 3
25/11/11	**T10** (MIB) (1 of 2)	Can I prescribe venlafaxine throughout pregnancy?	2	Pregnancy Choice of therapy	GP (F)	JR
25/11/11	**T11** (MIB) (2 of 2)	Can I have some information about efficacy & cost for Durolane injection for OA knee?	3	Choice of therapy	GP (F)	JR
03/02/12	**T12** (MIB)	Are there likely to be any problems if a patient has had metronidazole in pregnancy (1st trimester?)	2	Pregnancy Choice of therapy	GP (F)	Student 1
27/01/12	**T13** (MIB)	Which antidepressant should I use in hyponatraemia?	2	Choice of therapy Adverse effects	GP (M)	Student 1

Date completed	**Interview code** (MI centre code)	**Question**	**Enquiry complexity level**	**Type of enquiry**	**Clinician (Male/ Female)**	**Interviewer**
16/02/12	**T14** (MIB) (1 of 2)	What is the maximum dose of sodium valproate in a patient with renal impairment?	2	Admin & Dose	GP (M)	JR
16/02/12	**T15** (MIB) (2 of 2)	What antidepressant can I prescribe for a patient post myocardial infarction/CABG?	2	Choice if therapy Adverse effects	GP (M	JR
06/02/12	**T16** (MIC)	What is the correct dose of enoxaparin for DVT treatment?	2	Admin & dose	GP (F)	Student 2
09/01/12	**T17** (MID)	What evidence is there for using sea kelp to help with thinning hair & is it ok with other medicines?	1	Complementary medicines Interactions	GP (F)	Student 1
13/11/11	**T18** (MID)	Can I use terbinafine cream in a 1 year old?	1	Adverse effects	GP (M)	JR
02/02/12	**T19** (MID)	What level of activity will pamidronate still have 3 years after it has been stopped?	2	Pharmacokinetics	Dentist (M)	Student 1
25/11/11	**T20** (MIE)	What can I prescribe for post herpetic neuralgia in a patient with epilepsy and kidney impairment?	3	Choice of therapy Interaction Adverse effects	GP (F)	JR
5/01/12	**T21** (MIE)	Can I do root canal treatment in a patient with recent heart valve replacement?	2	Choice of therapy Adverse effects	Dentist (F)	JR
27/01/12	**T22** (MIE)	Can I prescribe amoxicillin if the patient is on methotrexate?	2	Interaction	GP (F) *(Also did face-to-face)*	Student 1
16/01/12	**T23** (MIE)	How do I switch a patient from citalopram to sertraline?	2	Adverse effects Interaction	GP (F)	Student 2
24/11//11	**T24** (MIE)	Do I need to give antibiotic prophylaxis for dental treatment in a patient with a knee replacement?	2	Adverse effects	Dentist (M)	Student 1
06/02/12	**T25** (MIE)	What is the correct dose of metronidazole in a 16 year old?	1	Admin & Dose	Dentist (F)	Student 3
27/01/12	**T26** (MIE)	Is it ok to use Exenatide if it has been out of the fridge for 6 weeks?	2	Pharmaceutical	GP (M)	Student 3
30/01/12	**T27 (**MIE)	Can I prescribe metronidazole in a patient with a history of GI problems?	2	Adverse effects	Dentist (F)	Student 2

Date completed	**Interview code** (MI centre code)	**Question**	**Enquiry complexity level**	**Type of enquiry**	**Clinician (Male/ Female)**	**Interviewer**
13/02/12	**T28** (MIE)	Does amoxicillin interact with allopurinol?	3	Interaction	Dentist (F)	Student 3
06/02/12	**T29** (MIE)	Which local anaesthetic can I use in a patient with allergy to some anaesthetics?	2	Choice of therapy	Dentist (F)	Student 3
16/02/12	**T30** (MIE)	Which local anaesthetic can I use in a patient with G6PD deficiency?	2	Choice of therapy	Dentist (F)	JR
10/02/12	**T31** (MIE)	Can I prescribe metronidazole with the patient's other medicines?	2	Admin & dose Interaction	Dentist (M)	Student 1
21/02/12	**T32** (MIF)	Can I prescribe citalopram if the patient is on nortriptyline for pain?	2	Admin & dose Interaction	GP (F)	JR
27/03/12	**T33** (MIF)	Is there a lactose free formulation of desmopressin for child with severe cow's milk/lactose allergy?	1	Pharmaceutical	GP (F)	JR
13/02/12	**T34** (MIF)	How do I convert a dose of aminophylline to theophylline?	2	Admin & Dose	GP (F)	Student 2
22/12/11	**T35** (MIG)	What antibiotic can I use for moderate acne in an 11 year old?	2	Choice of therapy	GP (F)	JR
26/01/12	**T36** (MIG)	Can I prescribe citalopram in a patient on low dose amitriptyline?	2	Choice of therapy Interactions	GP (F)	JR
17/02/12)	**T37** (MIG)	Do I have to restart lamotrigine at low doses if the patient has not had it for 2 weeks?	3	Admin & dose Pharmacokinetics	GP (F)	Student 3
16/02/12	**T38** (MIG)	Can I prescribe low dose amitriptyline in pregnancy (1st trimester)?	3	Admin & dose Pregnancy	GP (M)	JR
12/02/12	**T39** (MIG)	Are there likely to be any problems if a 1 year old child has had adult Bonjela (choline salicylate)?	2	Adverse effects	GP (F)	Student 3
13/02/12	**T40** (MIG)	Can citalopram be used in pregnancy for panic attacks?	3	Pregnancy Choice of therapy	GP (F)	Student 1

Appendix 18: Summary of medicines questions asked, demographics of clinicians and face-to-face interviews

Interview code	Characteristics of enquiries			Characteristics of clinicians			Characteristics of interviews		
	Question	Enquiry Complexity level	Type of Enquiry	Clinician (Male/ Female)	Number of years since first qualified	Used MI Service before	Time between enquiry and interview	Time and location	Duration (minutes/ seconds)
F1	Can I prescribe Duraphat 5000ppm (high strength fluoride toothpaste) in pregnancy and breastfeeding?	2	Choice of therapy Breastfeeding	Dentist (M)	4 years	Yes	27 days	13:30 after AM surgery Treatment room	26 min 4 s
F2	Can I prescribe fluoride toothpaste/saliva substitute in a 3 year old child having chemotherapy?	2	Choice of therapy Drug interactions Adverse effects	Dentist (M)	32 years	Yes	36 days	12:00 after AM surgery Office	44 min 3 s
F3	How do I treat recurrent vaginal thrush in pregnancy (2nd trimester)?	2	Choice of therapy Pregnancy	GP (F)	21 years	Yes	41 days	16:00 after PM surgery Drs office	20 min 44 s
F4	Can I prescribe chlorhexidine or hydrogen peroxide mouthwash for acute gingivitis in pregnancy (3rd trimester)?	2	Choice of therapy	Dentist (M)	6 years	Yes	16 days	13:00 after AM surgery Treatment room (Bit noisy /few staff in & out)	54 min 7 s
F5	Can I prescribe amoxicillin for dental infection in a housebound patient taking acenocoumarol?	2	Drug interactions Adverse effects	Dentist (M)	2 years	No	73 days	13:15 after AM surgery Private patient room	18 min 55 s
F6	What analgesics can I prescribe in pregnancy besides paracetamol?	2	Choice of therapy Pregnancy	GP (M)	6 years	Yes	41 days	17:00 before locum Prison waiting area	37 min 3 s

Interview code	Characteristics of enquiries			Characteristics of clinicians			Characteristics of interviews		
	Question	Enquiry Complexity level	Type of Enquiry	Clinician (Male/ Female)	Number of years since first qualified	Used MI Service before	Time between enquiry and interview	Time and location	Duration (minutes/ seconds)
F7	Can a patient take barley grass powder for dementia with their other medicines?	2	Complementary medicines Drug interactions Adverse effects	GP (F)	20 years	Yes	62 days	13:00 after AM surgery Drs office	23 min 25 s
F8	Can ciprofloxacin cause black tongue, what should I do?	3	Adverse effects	GP (M)	29 years	No	49 days	17;30 after PM surgery Drs office (Distracted)	32 min 41 s
F9	Can I prescribe amoxicillin for a dental abscess in a patient on dabigatran?	2	Drug interactions	Dentist (M)	15 years	Yes	40 days	12:45 after am surgery Treatment room (Staff in & out)	32 min
F10	Can I prescribe miconazole oral gel if the patient is on simvastatin?	2	Drug interactions Choice of therapy	Dentist (F)	38 years (UK 16 years)	Yes	56 days	13:00 after work Café (Bit noisy)	32 min
F11	Do I need to stop dabigatran (for AF) before an extraction?	2	Admin & Dose Adverse effects	Dentist (M)	26 years	Yes	115 days	14:00 After AM surgery Treatment room	36 min 40 s
F12	What antifungal can I prescribe for mastitis if the patient is breastfeeding?	2	Choice of therapy Breastfeeding	GP (M)	12 years	No	71 days	12:00 after AM surgery Drs office	~ 30 min (recorder failed at 23 min)
F13	Can my patient take St John's wort if they are taking topiramate for migraine?	2	Complementary medicines Drug interactions	GP (M)	7 years	Yes	144 days	9:00 before minor surgery clinic at 9:30	33 min 29 s

Interview code	Characteristics of enquiries			Characteristics of clinicians			Characteristics of interviews		
	Question	**Enquiry Complexity level**	**Type of Enquiry**	**Clinician (Male/ Female)**	**Number of years since first qualified**	**Used MI Service before**	**Time between enquiry and interview**	**Time and location**	**Duration (minutes/ seconds)**
F14	What do I need to do if a patient has taken simvastatin 40mg in early pregnancy?	3	Pregnancy Adverse effects	GP (F)	21 years	Yes	71 days	13:30 after clinic Drs office	33 min 16 s
F15	What is the highest dose of gabapentin I can prescribe in a patient with chronic kidney disease (CKD)?	3	Admin & Dose Renal	GP (F)	32 years	No	96 days	8:30 Day off At GP's home (Time to talk)	59 min 33 s